

**Multimedia Environments in the Foreign Language Classroom:
Effects on the Acquisition of the French Perfective and Imperfective Distinction**

Manuel Jesús Izquierdo
Department of Integrated Studies in Education
McGill University, Montreal
July, 2007

A Thesis Submitted to
McGill University in
Partial Fulfillment of the Requirements of the
Degree of Doctor of Philosophy



Library and
Archives Canada

Bibliothèque et
Archives Canada

Published Heritage
Branch

Direction du
Patrimoine de l'édition

395 Wellington Street
Ottawa ON K1A 0N4
Canada

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence

ISBN: 978-0-494-50833-6

Our file Notre référence

ISBN: 978-0-494-50833-6

NOTICE:

The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

AVIS:

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protègent cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.

De profundis clamavi ad te Domine, exaudi vocem meam

Acknowledgements

I have no words to express my gratitude to my supervisors Dr. Roy Lyster and Dr. Laura Collins for their academic and moral support throughout all the stressful states and activities required for the rewarding accomplishments and achievements during the completion of this work. I am very grateful to Dr. Robert Atkinson whose generous support made the development of the multimedia environments possible, and to María Isabel Zapata Vásquez for believing in and supporting this dream. I thank my committee members Dr. Janet Donin and Dr. Tom Cobb for their feedback throughout my studies. I also thank Dr. Carl Frederiksen for his feedback on and assistance with some of my statistical analyses.

I acknowledge the generosity of Randall Halter who patiently shared his statistical knowledge with me, and of Véronique Fortier who assisted me for hours and hours in the tedious lexical analyses and endless corrections of the treatment tasks and tests. I am thankful to Carole Clemance, Dr. Birgit Harley, Rebecca Ullman and Dr. Joanna White for sharing some of their research materials with me. I appreciate Ruben Zapata Díaz's and Fabián de Jesús Cerino Herrera's time and assistance during the hush and rush that the implementation of the treatment caused. I thank my friends Leah Rubinoff and Susan Ballinger for correcting all the fossilized interlanguage forms that I had included in previous drafts of this dissertation.

I am indebted to Danièle Guénette and Pierre Henrichon for sharing their friendship and home with me. I thank Dr. Daphnée Simard for her support and encouragement. I wish luck to all my friends and colleagues at McGill University in the

completion of their graduate studies; their feedback, support and encouragement were instrumental to keep me going throughout these four years.

I would have never reached this far in life without the love, dedication, support and encouragement of my parents, Cándida Sandoval de Izquierdo and Lucio Izquierdo. I owe them not only my life, but also eternal gratitude. I am fortunate to have my friends Eva, Nancy, Perla, Rosalba and Yolanda who have shared their love and lifetime experience with me over more than ten years. I specially acknowledge “el Maestro Eric” whose advice and life example encouraged me to wander the world to seek knowledge.

Funding for the completion of this work came from the standard research grants 410-2006-2212 and 410-2002-0988 awarded to Dr. Roy Lyster and from a fellowship (SSHRC Doctoral Fellowship, 2005-2007) granted to me by the Social Sciences and Humanities Research Council of Canada, in addition to a fellowship granted to me from the North American Mobility Project, McGill University Chapter.

Last, but not least, I want to acknowledge that the current work would have never been completed without the enthusiastic collaboration of the participating university's authorities, teachers and learners of French at the Language Centre, and the Computing Commons' staff; I regret that their names cannot be openly acknowledged due to ethical concerns.

Abstract

This study with young adult learners of French in foreign language classrooms examined the effects of multimedia instruction on the acquisition of a difficult area of second language (L2) grammar in French, namely, the use of the perfective (*passé composé*) and imperfective (*imparfait*) to mark past tense. In particular, the study investigated the impact of two aspects of multimedia instruction on the target grammar development: (a) the type of past tense targeted in instruction, prototypical (i.e., emergent perfective and imperfective forms) and non-prototypical (i.e., advanced perfective and imperfective forms), and (b) learners' readiness for non-prototypical past. The questions were: (a) Is multimedia instruction on non-prototypical past more effective at facilitating past tense improvement than multimedia instruction on prototypical past? (b) Does the L2 learners' past tense readiness mediate the effects of multimedia instruction?

To investigate these questions, two multimedia environments with four one-hour lessons were implemented over four weeks in seven university classes in Mexico. Lessons were identical between environments, integrating interactive written/aural narratives and video cartoons to facilitate meaning-oriented past tense production and comprehension. The environments included high past tense frequency, visual enhancement, input processing instruction and feedback to draw learners' attention to past tense. Environments differed only in past tense type: one required prototypical past; the other required non-prototypical past. Using a past tense test, learners ($n = 54$) were classified as non-ready or ready for non-prototypical past and assigned to one environment.

Past tense production and comprehension were assessed using three counterbalanced instruments before, immediately after, and three weeks after instruction. ANOVAs revealed that the environment's past tense type did not have an impact on learners' past tense production growth, whereas learners' past tense readiness did. While non-ready learners exhibited past tense growth immediately after instruction, ready learners did three weeks after instruction. Both groups improved past tense use in accordance with patterns that characterize the acquisition of the perfective and imperfective distinction. No immediate past tense improvement occurred in the comprehension tests, in which the perfective and imperfective differentiation from aural input constituted a challenge. Aspects of the multimedia instruction design and implementation that influenced the treatment results are discussed.

Résumé

Cette recherche réalisée avec de jeunes apprenants adultes de français langue étrangère traite des effets de l'enseignement multimédia sur l'utilisation du passé composé et de l'imparfait, des aspects grammaticaux reconnus comme étant particulièrement difficiles en apprentissage du français langue seconde. Notre recherche avait pour objet d'évaluer les effets de deux aspects de l'enseignement multimédia sur le développement de la compétence grammaticale ciblée : (a) les deux formes du passé, typiques (c.-à-d. les formes émergentes du passé composé et de l'imparfait), et atypiques (c.-à-d. les formes avancées du passé composé et de l'imparfait), et (b) la disposition (*readiness*) des apprenants pour l'apprentissage de la forme atypique du passé. Les deux questions étaient les suivantes : (1) l'enseignement du passé atypique par le biais de l'enseignement multimédia est-il plus efficace pour faciliter l'acquisition du passé que l'enseignement de la forme typique ? (2) La disposition des apprenants pour l'acquisition des formes du passé est-elle une variable qui peut modifier les effets de l'enseignement multimédia ?

Afin de répondre à ces questions, nous avons créé deux contextes d'enseignement multimédia comprenant chacun quatre leçons d'une heure étalées sur quatre semaines dans sept classes universitaires au Mexique. Les leçons étaient identiques et comprenaient des activités axées sur le sens (des récits narratifs écrits et oraux ainsi que de dessins animés sur bande vidéo) ayant pour objectif de faciliter la compréhension et la production des formes verbales du passé. Afin d'attirer l'attention des apprenants sur les formes du passé, nous les avons exposés à une très haute fréquence de verbes au passé, à une mise en évidence visuelle, à de la rétroaction, ainsi qu'à un enseignement par le traitement (*input processing instruction*). La seule différence entre les deux contextes

était la forme des verbes au passé : un contexte nécessitait obligatoirement la forme typique tandis que l'autre exigeait la forme atypique. La disposition des apprenants ($n=54$) à acquérir la forme atypique a été évaluée en fonction de leurs résultats à un test portant sur les formes du passé et ils ont ensuite été assignés à l'un ou l'autre des contextes.

La compréhension et la production des verbes au passé ont été évaluées avant que les participants reçoivent l'enseignement, immédiatement après qu'ils aient reçu l'enseignement, et trois semaines plus tard à l'aide de trois instruments équilibrés. Une analyse de variance (ANOVA) a révélé que le contexte d'enseignement n'a pas eu d'effet sur l'apprentissage, contrairement à la disposition des apprenants. En effet, les apprenants peu ou pas disposés ont augmenté leur capacité à utiliser le passé immédiatement après la séquence d'enseignement, tandis que les apprenants plus disposés n'ont démontré cette augmentation que trois semaines plus tard. Cependant, les deux groupes ont amélioré leur maîtrise du passé conformément aux itinéraires qui caractérisent l'acquisition du passé composé et de l'imparfait. Les tests de compréhension dans lesquels la différenciation du passé composé et de l'imparfait à l'oral représente un défi pour les apprenants n'ont quant à eux révélé aucune amélioration immédiate. Les aspects de l'élaboration et de l'implantation du contexte multimédia qui ont eu un impact sur les résultats sont présentés et discutés.

Table of Contents

Acknowledgements	i
Abstract	iii
Résumé	v
Table of contents	vii
List of tables	xiii
List of figures	xx
List of examples	xxi
 Chapter 1: Introduction	 1
 Chapter 2: Multimedia and L2 learning	 12
2.1 Multimedia and second language instruction	12
2.2 L2 multimedia input	13
2.2.1 Multimedia and comprehension of L2 input	14
2.2.2 Multimedia and L2 intake	15
2.2.2.1 L2 lexical development	16
2.2.2.2 L2 grammar development	20
2.3 Multimedia and L2 output	24
2.3.1 Attention to form in multimedia-facilitated output	25
2.3.2 L2 development and multimedia-facilitated output	26
2.4 Multimedia and L2 grammar instruction	29
2.5 Chapter summary	34
 Chapter 3: Past tense acquisition in French L2	 35
3.1 Tense and grammatical aspect in French L2	35
3.1.1 Tense	36
3.1.2 Grammatical aspect	37
3.1.2.1 Perfective	37
3.1.2.2 Imperfective	38
3.2 The aspect hypothesis and the acquisition of the French past tense	41
3.2.1 Lexical aspect	41
3.2.2 Predicted patterns of past tense development	43
3.2.2.1 Predicted early past tense marking	43
3.2.2.2 Predicated advanced past tense marking	45
3.3 Documented patterns of past tense development in French L2	47
3.3.1 Past tense emergence	47
3.3.2 Perfective and imperfective development	48
3.4 Challenges in past tense development	50

3.4.1	Form-function mapping complexity	50
3.4.2	L2 input	51
3.4.3	Cognitive challenges	53
3.4.4	L1 influence	54
3.4.5	Instructional challenges	58
3.5	Investigating the effects of multimedia on past tense development	62
3.5.1	Research questions and hypotheses	66
3.6	Chapter summary	69
Chapter 4: Method		70
4.1	Research context	70
4.1.1	Participating classes	71
4.1.2	Participating teachers	72
4.1.3	Classroom instruction	73
4.1.4	Previous past tense instruction	74
4.2	Participants	75
4.3	Design	77
4.4	Experimental multimedia environments	77
4.4.1	Form-focussed instruction	78
4.4.1.1	L2 input	78
4.4.1.1.1	Frequency	79
4.4.1.1.2	Visual enhancement	79
4.4.1.1.3	Input processing instruction	80
4.4.1.2	L2 output	80
4.4.1.2.1	Feedback on form	81
4.4.1.2.2	Feedback on meaning	84
4.4.2	Lexical complexity	84
4.4.3	Multimedia lessons	86
4.4.3.1	Lesson 1: Interactive scrambled sentence task	88
4.4.3.2	Lesson 2: Multimedia dictogloss	90
4.4.3.3	Lesson 3: True/false video watching task	92
4.4.3.4	Lesson 4: Multimedia-guided writing task	96
4.4.4	Verbal predicates	99
4.4.5	Multimedia past tense instruction	104
4.4.5.1	Prototypical instruction (Environment E1)	104
4.4.5.2	Non-prototypical instruction (Environment E2)	105
4.5	Assignment of experimental multimedia learning condition	107
4.5.1	Developmental condition	108
4.5.2	Learning environment	108
4.5.3	Lesson administration	110

4.6	Data collection instruments	111
4.6.1	Past tense tests	112
4.6.1.1	Cloze task	114
4.6.1.1.1	Organization	114
4.6.1.1.2	Administration	115
4.6.1.2	Situational task	116
4.6.1.2.1	Organization	116
4.6.1.2.2	Administration	118
4.6.1.3	Listening preference test	118
4.6.1.3.1	Organization	123
4.6.1.3.2	Administration	126
4.6.2	Treatment and classroom reports	126
4.6.2.1	Student background questionnaire	126
4.6.2.2	Lesson logs	127
4.6.2.3	Lesson questionnaires	127
4.6.2.4	Input enhancement questionnaire	129
4.6.2.5	Teacher weekly reports	129
4.6.2.6	Classroom observations	130
4.7	Study timeline	130
4.8	Chapter summary	133
Chapter 5: Analyses and Presentation of Results		134
5.1	Past tense test results	135
5.1.1	Scoring procedures and models for analyses	135
5.1.1.1	Scoring procedures	135
5.1.1.1.1	Cloze task scoring	136
5.1.1.1.2	Situational task scoring	138
5.1.1.1.3	Listening task scoring	140
5.1.1.1.4	Reaction time measurement	140
5.1.1.2	Models for analyses of past tense scores	142
5.1.2	Test version analyses	144
5.1.3	Baseline data (Pre-test results)	145
5.1.3.1	Cloze task	145
5.1.3.1.1	Overall past tense	145
5.1.3.1.2	Perfective and imperfective	146
5.1.3.1.3	Prototypical and non-prototypical past	148
5.1.3.2	Situational task	150
5.1.3.2.1	Overall past tense	150
5.1.3.2.2	Perfective and imperfective	151
5.1.3.2.3	Prototypical and non-prototypical past	151
5.1.3.3	Listening task	152
5.1.3.3.1	Overall past tense	152
5.1.3.3.2	Perfective and imperfective	152
5.1.3.3.3	Prototypical and non-prototypical past	153

5.1.3.4	Reaction times	155
5.1.3.4.1	Overall past tense	155
5.1.3.4.2	Perfective and imperfective	155
5.1.3.4.3	Prototypical and non-prototypical	156
5.1.3.5	Summary of appropriate past tense use at pre-test time	156
5.1.4	Treatment effects	158
5.1.4.1	Cloze task score changes	158
5.1.4.1.1	Overall past tense	158
5.1.4.1.2	Perfective and imperfective	160
5.1.4.1.3	Prototypical and non-prototypical past	163
5.1.4.2	Situational task score changes	165
5.1.4.2.1	Overall past tense	165
5.1.4.2.2	Perfective and imperfective	166
5.1.4.2.3	Prototypical and non-prototypical past	167
5.1.4.3	Listening test score changes	169
5.1.4.3.1	Overall past tense	169
5.1.4.3.2	Perfective and imperfective	171
5.1.4.3.3	Prototypical and non-prototypical past	171
5.1.4.4	Reaction time changes	173
5.1.4.4.1	Overall past tense	173
5.1.4.4.2	Perfective and imperfective	174
5.1.4.4.3	Prototypical and non-prototypical past	175
5.1.4.5	Summary of treatment effects	175
5.2	Treatment and classroom reports	177
5.2.1	Learners' attention to the multimedia lessons	178
5.2.1.1	Logs (Lesson 1)	178
5.2.1.1.1	Counts of appropriate and erroneous sentences and prompt sets	181
5.2.1.1.2	Time on appropriate and erroneous sentences and prompt sets	183
5.2.1.2	Lesson questionnaires	188
5.2.1.2.1	Lesson 1: Scrambled sentence task	189
5.2.1.2.2	Lesson 2: Multimedia dictogloss	190
5.2.1.2.3	Lesson 3: True/false video-watching task	191
5.2.1.2.4	Lesson 4: Multimedia-guided writing task	193
5.2.1.3	Input enhancement questionnaire	194
5.2.2	Teachers' attention to past tense	195
5.2.2.1	Teachers' weekly reports	195
5.2.2.2	Classroom observations	198
5.2.3	Summary of treatment and classroom reports	201
5.3	Revisiting the hypotheses	202
5.4	Chapter summary	205

Chapter 6: Discussion	206
6.1 Answers to the research questions	206
6.2 Multimedia effects on past tense development	208
6.2.1 Effects on the development of grammatical aspect	210
6.2.2 Effects on the development of prototypical and non-prototypical past	213
6.3 Learners' attention to form during multimedia past tense instruction	219
6.3.1 Attention to form through input enhancement	220
6.3.2 Attention to form through feedback	222
6.3.3 Highlights of the video-based lesson	227
6.4 Limitations and future research directions	236
6.5 Contributions and implications	243
Chapter 7: Conclusion	249
References	252
Appendices	
Appendix A Tense-aspect/mood in immersion teachers' discourse	262
Appendix B1 Ethics and consent forms	264
Ethics approval 2006-2007	265
Ethics approval 2007-2008	266
Consent form	267
Appendix B2 Data collection instruments (Test samples)	268
Cloze task samples	269
Situational task samples	270
Listening test samples	271
Appendix B3 Data Collection Instruments (Questionnaires)	272
Linguistic background questionnaire	273
Participant's attitude questionnaire for Lesson 1	274
Input enhancement questionnaire	276
Appendix B4 Data Collection Instruments (Classroom observation sheet)	277
Appendix C Participants' demographics	279
Appendix D Lexical aspect analyses of verbal predicates per lesson	282
Appendix E Lexical profile analyses of past tense tasks per lesson	299
Appendix F Worksheet samples for multimedia Lessons 1 & 3	304
Follow-up task sheet for Lesson 1 (Environment E1)	305
Follow-up task sheet for Lesson 3 (Environment E2)	306
Appendix G ANOVA and pairwise comparison tables of pre-test scores	307
Appendix H Tables of means for pre-test scores	323
Appendix I ANOVA and pairwise comparison tables of score changes over time	331
Appendix J Treatment effect figures	354

Appendix K	Tables of means over time	357
Appendix L	Tables of mean contrast probabilities and effect sizes	366
Appendix M	Tables of statistical analyses of treatment data	369
Appendix N	Percentage tables for participants' answers to lesson retrospective questionnaires	381

List of Tables

Tables in Text

3.1	Tense-aspect marking in French and Spanish	36
3.2	Imperfective values in French and Spanish	39
3.3	Aspectual categories	42
4.1	Distribution of learners across participating classes	72
4.10	Vocabulary frequency profiles for the multimedia lessons	85
4.11	Description of the multimedia lessons	87
4.20	Distribution of verbal predicates per lesson	102
4.21	Distribution of verbal predicates in the environments	106
4.22	Participant distribution across experimental multimedia learning conditions	110
4.23	Administration of test versions per experimental group	113
4.24	Perfective and imperfective tokens with verbal predicates in the Cloze Task	115
4.25	Perfective and imperfective tokens with verbal predicates in the Situational Task	117
4.26	Perfective and imperfective markers with verbal predicates in the Listening Task	124
5.1	Past tense scores at pre-test per test-version	144
5.7	Experimental groups' past tense means in the Cloze Task at pre-test	146
5.9	Developmental groups' perfective and imperfective means in the Cloze Task at pre-test	147
5.13	E1 and E2 groups' prototypical and non-prototypical means in the Cloze Task at pre-test	149
5.16	Experimental groups' past tense means in the Situational Task at pre-test	150
5.24	Experimental groups' perfective and imperfective means in the Listening Task at pre-test	153
5.26	Experimental groups' prototypical and non-prototypical means in the Listening Task at pre-test	154
5.34	Developmental groups' cloze task scores over time	159
5.37	Cloze task perfective and imperfective means over time	160
5.40	E1 and E2 groups' prototypical and non-prototypical scores after mixed design ANOVAs	164
5.43	Situational task scores by testing times	165
5.66	Experimental groups' erroneous sentence selection, prompt sets and repair	180
5.67	Time on appropriate and erroneous sentences and prompt sets	184
5.68	Experimental groups' time on prompt sets 1, 2, and 3	185
5.77	Distribution of class topics in teachers' weekly reports	196
5.78	Distribution of class activities in classroom observations	199

Tables in Appendix A

3.4	Distribution of tense-aspect/mood in immersion teachers' discourse	263

Tables in Appendix C

4.2	Age distribution	280
4.3	Participants' occupation	280
4.4	Participants' knowledge of foreign languages other than French	280
4.5	Participants' number of years learning French	280
4.6	Previous French learning in other schools	281
4.7	Current attendance to French classes at other schools	281
4.8	French study hours outside the classroom	281
4.9	French study activities outside the classroom	281

Tables in Appendix D

4.12	Verbal predicates in prototypical environment Lesson 1	283
4.13	Verbal predicates in prototypical environment Lesson 2	285
4.14	Verbal predicates in prototypical environment Lesson 3	286
4.15	Verbal predicates in prototypical environment Lesson 4	290
4.16	Verbal predicates in non-prototypical environment Lesson 1	291
4.17	Verbal predicates in non-prototypical environment Lesson 2	293
4.18	Verbal predicates in non-prototypical environment Lesson 3	294
4.19	Verbal predicates in non-prototypical environment Lesson 4	298

Tables in Appendix G

5.2	One-way ANOVA of score comparisons between cloze task versions at pre-test time	308
5.3	One-way ANOVA of score comparisons between situational task versions at pre-test	308
5.4	One-way ANOVA of score comparisons between listening task versions at pre-test	308
5.5	One-way ANOVA of reaction time comparisons between listening task versions at pre-test	309
5.6	Two-way ANOVA of experimental groups' past tense score comparisons in the Cloze Task at pre-test	309
5.8	Mixed design ANOVA of experimental groups' perfective and imperfective score comparisons in the Cloze Task at pre-test	310
5.8 A	Within developmental condition pairwise comparisons for the interaction between developmental condition and grammatical aspect in the cloze task at pre-test	311

5.8 B	Within developmental condition pairwise comparisons for the interaction between developmental condition and grammatical aspect in the cloze task at pre-test	311
5.11	Mixed design ANOVA of experimental groups' prototypical and non-prototypical score comparisons in the Cloze Task at pre-test	312
5.11 A	Within learning environment pairwise comparisons for the interaction between past tense type and learning environment in the cloze task at pre-test	313
5.11 B	Within past tense type pairwise comparisons for the interaction between past tense type and learning environment in the cloze task at pre-test	313
5.15	Two-way ANOVA of experimental groups' past tense score comparisons in the situational task at pre-test	314
5.17	Mixed design ANOVA of experimental groups' perfective and imperfective score comparisons in the situational task at pre-test	315
5.19	Mixed design ANOVA of experimental groups' prototypical and non-prototypical score comparisons in the situational task at pre-test	316
5.21	Two-way ANOVA of experimental groups' past tense score comparisons in the Cloze Task at pre-test	317
5.23	Mixed design ANOVA of experimental groups' perfective and imperfective score comparisons in the listening task at pre-test	318
5.25	Mixed design ANOVA of experimental groups' prototypical and non-prototypical score comparisons in the listening task at pre-test	319
5.27	Two-way ANOVA of experimental groups' past tense reaction time comparisons in at pre-test	320
5.29	Mixed design ANOVA of experimental groups' perfective and imperfective reaction time comparisons in the listening task at pre-test	321
5.31	Mixed design ANOVA of experimental groups' prototypical and non-prototypical reaction time comparisons in the listening task at pre-test	322

Tables in Appendix H

5.10	Experimental groups' perfective and imperfective means in the Cloze Task at pre-test	324
5.12	Developmental groups' prototypical and non-prototypical means in the Cloze Task at pre-test	325
5.14	Experimental groups' prototypical and non-prototypical means in the Cloze Task at pre-test	326
5.18	Experimental groups' perfective and imperfective means in the situational task at pre-test	327
5.20	Experimental groups' prototypical and non-prototypical means in the situational task at pre-test	328

5.22	Experimental groups' past tense means in the listening task at pre-test	328
5.28	Experimental groups' past tense reaction time means at pre-test	329
5.30	Experimental groups' perfective and imperfective reaction time in the in the listening task at pre-test	329
5.32	Experimental groups' prototypical and non-prototypical reaction time means in the listening task at pre-test	330

Tables in Appendix I

5.33	Mixed design ANOVA of experimental groups' past tense score comparisons over time in the Cloze Task	332
5.33 A	Pairwise comparisons of cloze task means for the main effect test time	333
5.33 B	Within developmental condition pairwise comparisons of cloze task means for the interaction between test time and developmental condition	333
5.36	Mixed design ANOVA of experimental groups' over time perfective and imperfective score comparisons in the Cloze Task	334
5.36 A	Within grammatical aspect pairwise comparisons for the interaction between grammatical aspect and testing time	335
5.36 B	Within testing time pairwise comparisons for the interaction between grammatical aspect and testing time	335
5.36 C	Pairwise comparisons for the interaction between developmental condition, grammatical aspect and testing time	336
5.39	Mixed design ANOVA of experimental groups' over time prototypical and non-prototypical score comparisons in the Cloze Task	337
5.39 A	Within developmental condition pairwise comparisons for the interaction between developmental condition and past type	338
5.39 B	Within past type pairwise comparisons for the interaction between developmental condition and past type	338
5.39 C	Within past type pairwise comparisons for the interaction between past type and learning environment	339
5.39 D	Within learning environment pairwise comparisons for the interaction between past type and learning environment	339
5.42	Mixed design ANOVA of experimental groups' past tense scores comparisons over time in the situational task	340
5.42 A	Pairwise comparisons for the main effect testing time in the situational task	341
5.45	Mixed design ANOVA of experimental groups' over time perfective and imperfective score comparisons in the situational task	342
5.47	Mixed design ANOVA of experimental groups' over time prototypical and non-prototypical score comparisons in the	343

	situational task	
5.47 A	Within testing time pairwise comparisons for the interaction effect between developmental condition, past type and testing time	344
5.47 B	Within past type pairwise comparisons for the interaction effect between developmental condition, past type and testing Time	345
5.51	Mixed design ANOVA of experimental groups' past tense score comparisons over time in the listening task	346
5.51 A	Within testing time pairwise comparisons for the interaction between environment and testing time in the listening task	347
5.51 B	Within environment pairwise comparisons for the interaction between environment and testing time in the listening task	347
5.55	Mixed design ANOVA of experimental groups' over time perfective and imperfective score comparisons in the listening task	348
5.57	Mixed design ANOVA of experimental groups' over time prototypical and non-prototypical score comparisons in the listening test	349
5.57 A	Within testing time pairwise comparisons for the interaction effect between grammatical aspect and testing time	350
5.57 B	Within grammatical aspect pairwise comparisons for the interaction effect between grammatical aspect and testing time	350
5.60	Mixed design ANOVA of experimental groups' reaction time comparisons over time	351
5.60 A	Pairwise comparisons for the main effect test time	351
5.62	Mixed design ANOVA of experimental groups' over time perfective and imperfective reaction time comparisons	352
5.64	Mixed design ANOVA of experimental groups' over time prototypical and non-prototypical reaction time comparisons	353

Tables in Appendix K

5.35	Experimental groups' Cloze Task score means over time	358
5.38	Experimental groups' perfective and imperfective Cloze Task means over time	358
5.41	Experimental groups' prototypical and non-prototypical Cloze Task means over time	359
5.44	Experimental groups' situational task score means over time	359
5.46	Experimental groups perfective and imperfective situational task score means over time	360
5.48	Developmental groups' prototypical and non-prototypical situational task score means over time	360
5.50	Experimental groups prototypical and non-prototypical situational task score means over time	361
5.52	Multimedia environment groups' listening score means over time	361
5.54	Experimental groups' listening task score means over time	362
5.56	Experimental groups' perfective and imperfective listening score	362

	means over time	
5.58	Prototypical and non-prototypical listening task score means over time	363
5.59	Experimental groups prototypical and non-prototypical listening task score means over time	363
5.61	Experimental groups' reaction time means over time	364
5.63	Experimental groups' perfective and imperfective reaction time means over time	364
5.65	Experimental groups' prototypical and non-prototypical reaction time means over time	365

Tables in Appendix L

5.49	Probabilities and effect sizes for situational task mean contrasts of the interaction between developmental condition, test time and past type	367
5.53	Probabilities and effect sizes for listening task mean contrasts of the interaction between environment and test time	368

Tables in Appendix M

5.66 A	Table of maximum likelihood analyses of variance of correct and erroneous responses in Lesson 1	370
5.66 B	Table of maximum likelihood predicted values for error frequency in Lesson 1	370
5.66 C	Table of maximum likelihood analyses of variance of immediate and delayed repairs in Lesson 1	371
5.66 D	Table of maximum likelihood predicted values of immediate and delayed repairs in Lesson 1	371
5.67 A	Two-way ANOVA of experimental groups' times on erroneous sentences in Lesson 1	372
5.67 B	Two-way ANOVA of experimental groups' times on prompts in Lesson 1	372
5.67 C	Two-way ANOVA of experimental groups' times on incorrect repairs in Lesson 1	373
5.67 D	Two-way ANOVA of experimental groups' times on correct repairs in Lesson 1	373
5.67 E	Two-way ANOVA of experimental groups' times on immediate repairs in Lesson 1	374
5.67 F	Two-way ANOVA of experimental groups' times on delayed repairs in Lesson 1	374
5.67 G	Within environment pairwise comparisons for time mean differences on delayed repairs	375
5.67 H	Within developmental condition pairwise comparisons for time mean differences on delayed repairs	375

5.68 A	Mixed design ANOVA of experimental groups' times on prompt sets in Lesson 1	376
5.68 B	Pairwise mean comparisons for the main effect prompt set	376
5.69	Chi-square analyses of experimental groups' answer frequency in Lesson 1 Questionnaire	377
5.70	Chi-square analyses of experimental groups' answer frequency in Lesson 2 Questionnaire	378
5.71	Chi-square analyses of experimental groups' answer frequency in Lesson 3 Questionnaire	379
5.72	Chi-square analyses of experimental groups' answer frequency in Lesson 4 Questionnaire	380

Tables in Appendix N

5.73	Participants' answers to Lesson 1 retrospective questionnaire	382
5.74	Participants' answers to Lesson 2 retrospective questionnaire	384
5.75	Participants' answers to Lesson 3 retrospective questionnaire	386
5.76	Participants' answers to Lesson 4 retrospective questionnaire	388

List of Figures

Figures in Text

4.9	Scrambled sentence task in Environment E1	88
4.10	Metalinguistic prompts in the scrambled sentence task in Environment E1	89
4.11	Vocabulary preparation example for Lesson 2 (Environment E1)	91
4.12	Sentence and vocabulary presentation in video-watch task in Environment E2	93
4.13	Feedback on meaning in the video-watch task in Environment E2	94
4.14	Vocabulary/Warm-up task for Lesson 4 in Environment E2	97
4.15	Environment 2 Lesson 4 newspaper article with blanks	98
4.16	Experimental conditions in the computer lab	111
4.21	Lesson and test administration	130
5.2	Developmental groups' perfective and imperfective means over time	161
5.5	Developmental groups' prototypical and non-prototypical situational task means over time	167
5.6	Multimedia environment groups' listening score means over time	170
5.7	Prototypical and non-prototypical listening task means over time	172
6.1	Use of grammatical aspect in Lesson 4 materials	233

Figures in Appendix B2

4.17	Computer screen sample of Situational Task version A	270
4.18	Computer screen sample of Situational Task version B	270
4.19	Computer screen sample for Listening Test version A	271
4.20	Computer screen sample for Listening Test version B	271

Figures in Appendix E

4.1	Lexical analyses for Lesson 1 in the prototypical environment	300
4.2	Lexical analyses for Lesson 1 in the non-prototypical environment	300
4.3	Lexical analyses for Lesson 2 in the prototypical environment	301
4.4	Lexical analyses for Lesson 2 in the non-prototypical environment	301
4.5	Lexical analyses for Lesson 3 in the prototypical environment	302
4.6	Lexical analyses for Lesson 3 in the non-prototypical environment	302
4.7	Lexical analyses for Lesson 4 in the prototypical environment	303
4.8	Lexical analyses for Lesson 4 in the non-prototypical environment	303

Figures in Appendix J

5.1	Experimental groups' Cloze Task score means over time	355
5.3	E1-NR and E2-NR groups' perfective and imperfective means in the cloze task over time	355
5.4	E1-RD and E2-RD groups' perfective and imperfective means in the cloze task over time	356

List of Examples

Examples in Text

3.1	Perfective with achievements	44
3.2	Perfective with accomplishments	44
3.3	Imperfective with statives	45
3.4	Imperfective with activities	45
3.5	Perfective with activities	46
3.6	Perfective with statives	46
3.7	Imperfective with accomplishments	46
3.8	Imperfective with achievements	46
5.1	Learner's use of past tense in the Cloze Task	137
5.2	Learner's answers in the Situational Task	139
6.1	Production sample from a NR learner in E1 during Lesson 3	228
6.2	Production sample from a NR learner in E2 during Lesson 3	228

Examples in Appendix B2

4.1	Sample of Cloze Task version A	269
4.2	Sample of Cloze Task version B	269

CHAPTER 1

INTRODUCTION

The integration of computers in education is embraced on the premise that they provide new possibilities for learning (Chapelle, 2001, 2003; Cobb, 2005; Warschauer & Kern, 2000). Learning can be facilitated through the use of features inherent in computer programs and Internet resources, such as text, images, video, sound, learner-computer interactivity, databases, and networking, to mention only a few. These features are hypothesized to benefit learning, because (a) they can constitute distinct sources of input/output (e.g., visual, aural, typographical) (Brett, 1998); (b) they can provide learners with vast amounts of exposure to the L2 (Gaskell & Cobb, 2004); (c) they sustain learners' interest in the lesson content (Ayres, 2002); (d) they increase learners' attention through the learning process (e.g., Edwards, Monaghan & Knight, 2000; Edwards, Pemberton, Knight & Monaghan, 2002); and (e) they allow learners to work at their own pace (Torlakovic & Deugo, 2004; Warschauer, Turbee & Roberts, 1996).

Among the various computer applications available in education to date, multimedia environments have increasingly gained the attention of the educational and research community over the last past ten years (Mayer, 2005). These environments consist of computer applications that integrate aural and written texts, static or motion graphics, animated pictures, video and interactivity during “online-instructional presentations, interactive lessons, e-courses, simulation games, virtual reality, and computer-supported in-class presentations” (p. ix).

Learning from multimedia occurs when people construct new knowledge as a result of their interaction with (written or aural) texts and (static or dynamic) pictures in

computer applications (Mayer, 2005). Multimedia learning can be fostered in a wide array of educational domains (Atkinson, 2005), such as mathematics, biology, social sciences, business education, aviation and military training, to mention only a few, and its benefit has been investigated with different clienteles such as children, young and adult learners (see Mayer, 2005).

In the field of second language (L2) education, multimedia environments permit the creation of rich, meaningful, and diversified input and output practice opportunities in which exposure to the meaning-oriented use of the L2 can help learners develop mapping between linguistic forms (i.e., form) and their communicative functions (i.e., meaning). These form/function mapping opportunities foster conditions for learners to modify aspects of their emerging linguistic systems (i.e., interlanguage, Selinker, 1972), promoting L2 restructuring and advancement (Chapelle, 2005; Plass & Jones, 2005).

Empirical evidence suggests that exposure to natural and comprehensible use of the L2 in multimedia-based reading and listening tasks helps learners develop comprehension skills and acquire vocabulary (for reviews, see Chun & Plass, 1997; Jones & Plass, 2002; Plass, Chun, Mayer & Leutner, 2003). Further, some studies have examined the manner in which aspects of multimedia environments appear to facilitate such comprehension and vocabulary development (e.g., Duquette & Delphine, 1998; Jones & Plass, 2002; Yoshi & Flaitz, 2002). The effects of multimedia on development of other L2 areas such as grammar have received less attention, however. Insights of such effects have been mostly provided through observations (e.g., Edwards, Monaghan & Knight, 2000; Edwards, Pemberton, Knight & Monaghan, 2002), recommendations on aspects of an effective application (e.g., Fotos & Browne, 2004; L. Murray & Barnes,

1998), or interesting grammar practice exercises (LeLoup & Ponterio, 2003, 2006); unfortunately, empirical evidence of the impact of multimedia instruction on learners' emerging L2 grammar is absent.

Mayer (2005) points out that although documentations of this type are informative and contribute to highlight the potential of multimedia instruction, empirical evidence is needed with respect to the manner in which people construct new knowledge from their interaction with aspects/features of the multimedia environments, rather than descriptions of “untested best practices or software development projects” (p. ix). In addition, Mayer proposes that “multimedia learning environments should be designed in ways that are consistent with what is known about how people learn” (p. ix) and results from these investigations should have implications for the design of multimedia environments and their integration in education (see also the discussion presented by Huh & Hu, 2005; Salaberry, 2001).

The purpose of this doctoral dissertation was to expand investigations into the effects of multimedia instruction on the development of L2 grammar among classroom instructed learners of French in the foreign language context and shed light on aspects of L2 multimedia instruction that can contribute to L2 grammar development. The impact of multimedia effects on L2 grammar development were examined on a notoriously difficult area of French L2 grammar: the distinctive use of two past tense markers, perfective (*passé composé*: *L'été dernier, je suis allé au cinéma* “I went to the cinema during summer” – one single occasion) and imperfective (*imparfait*: *L'été dernier, j'allais au cinéma* “I went/ used to go/ would go to the theatre during summer” – multiple occasions) (Ayoun, 2005; Harley, 1989; Harley & Swain, 1978).

Investigations into the development of past tense markers suggest that learners proceed through the acquisition of perfective and imperfective operating on associations between their functional values and temporality inherent in the meaning of verbal predicates (Aoun & Salaberry, 2005; Bardovi-Harlig, 2000; Salaberry & Shirai, 2002). These associations benefit perfective and imperfective use in contexts where the functional values of these forms align with the inherent temporality of verbal predicates (i.e., prototypical marking; e.g., *aimer les chats* “to like cats” and *imparfait* as in *j’aimais les chats* “I like-IMP cats”). However, empirical evidence shows that these associations seem to hinder perfective and imperfective marking in contexts where the functional values of these forms contradict the temporality inherent in the meaning of verbal predicates (i.e., non-prototypical marking; e.g., *aimer les chats* and *passé composé* as in *j’ai aimé les chats* “I like-PER cats”) (Aoun, 2004; Harley, 1992; Howard, 2002).

Howard (2002) suggested that instruction on non-prototypical past could facilitate the development of the perfective and imperfective distinction, helping learners improve past tense use in contexts in which perfective and imperfective functions contradict the inherent semantics of verbs. Past tense instruction, particularly on non-prototypical contexts, seems to be compounded by a combination of factors such as learners' predisposition for prototypical marking in non-prototypical contexts (Andersen, 2002), the frequency and distribution of past tense makers in the L2 (Andersen, 2002; Harley, Allen, Cummins & Swain, 1987; Kaplan, 1987), the unbalanced use of their functional values (Aoun, 2004), the difficulty of creating rich instructional meaning-oriented contexts for the use of non-prototypical marking (Abrate, 1983), and the absence of attention to past tense during meaning-based interventions (Harley, 1989; Lyster, 2004b)

In line with the hypothesized benefits of multimedia environments in L2 learning, multimedia environments constitute a valuable tool for the teaching of the past tense, as they facilitate control over these variables in instructional interventions. The integrative use of video, audio, and graphics permits the creation of varied, interesting contexts for comprehension and production tasks in which the frequency and distribution of past tense markers with verbal predicates can be multiplied. Congruent with pedagogical recommendations for the teaching of the past tense presented by Blyth (2005), in these meaning-oriented comprehension and production contexts, computer program features (e.g., visual enhancement), the essentialness of past tense use for task completion and feedback can be integrated to systematically drive learners' attention to past tense.

This type of (form-) focussed multimedia instruction may not only help learners gain past tense knowledge, but it also provides them with multiple opportunities to realize past tense areas that they need to develop, such as the use of past tense in non-prototypical contexts. Moreover, continuous use of past tense in multimedia-based tasks provides learners with reoccurring opportunities to test and gain control over past tense knowledge that may lead to interlanguage restructuring.

Classroom instructed second language acquisition (SLA) research has revealed that variables such as the complexity of L2 target forms and learners' readiness to process them can mediate instructional L2 grammar gains, however. Some studies show that instructional gains operate within patterns of L2 grammar development (Pienemann, 1987, 1999; Spada & Lightbown, 1999) and that instruction may help learners gain control not only over the targeted structures, but also over structures that are

hypothesized to be acquired prior to or after the targeted ones (e.g., Ammar & Lightbown, 2005; Doughty, 1991).

Drawing on these SLA classroom findings, this doctoral study examined the manner in which two variables could mediate the effects of multimedia instruction on the development of past tense marking: the type of past tense marking present in the multimedia exposure (i.e., prototypical or non-prototypical) and the current past tense developmental stage of the multimedia users (i.e., *developmentally ready* or *non-developmentally ready* for non-prototypical marking). Two research questions were formulated to examine the manner and degree to which these two aspects of multimedia instruction could facilitate the development of the perfective and imperfective distinction.

Q1: Is form-focussed multimedia instruction on non-prototypical past more effective at facilitating past tense improvement than form-focussed multimedia instruction on prototypical past?

Q2: Does the past tense developmental condition of L2 learners mediate the effects of multimedia instruction on past tense improvement?

To investigate these questions, two multimedia environments were created. Both environments included four one-hour lessons, which were implemented weekly over four weeks in seven intact university classes of French in Mexico. Lessons were identical between environments in terms of tasks, task sequence, and number of past tense predicates. Audio, video cartoons, images, and interactive texts were integrated, to create contexts for rich past tense production and comprehension in aural, written, and video-based narratives. Typographical enhancement, past tense essentialness for task

completion, and feedback were held constant throughout the environments' lessons to facilitate learners' attention to the use of the target forms during input and output tasks.

The environments differed only in terms of the past tense marking used with verbal predicates. 'Environment E1' (i.e., E1) fostered input and output opportunities for perfective and imperfective use in prototypical contexts (e.g., *aimer les chats* "to like cats" combined with imperfective leading to *j'aimais les chats* "I like-IMP cats"). 'Environment E2' (i.e., E2) provided opportunities for non-prototypical perfective and imperfective marking (e.g., *aimer les chats* "to like cats" and perfective leading to *j'ai aimé les chats* "I like-PER cats").

Learners' past tense developmental readiness prior to the implementation of the multimedia instruction was determined using a tense-aspect test, which included equal numbers of prototypical and non-prototypical contexts. Based on their appropriate use of past tense in the test, learners were classified as being *non-developmentally ready* (NR) or *developmentally ready* (RD) for the use of non-prototypical marking. Prior to the experiment, learners in the RD category significantly exhibited more frequent use of non-prototypical marking than their NR counterparts in the past tense proficiency test. Learners from each developmental classification were then assigned to one of the multimedia environments. This combination of multimedia environments and developmental readiness facilitated the observation of the effects of multimedia on past tense change in four different experimental L2 multimedia-learning conditions:

E1-NR Learners in this condition ($n = 12$) were not developmentally ready for the use of non-prototypical marking and were exposed to environment E1, which restricted

their perfective and imperfective use to past tense forms in line with their current developmental competencies: prototypical marking.

E1-RD Learners in this condition ($n = 12$) were developmentally ready for non-prototypical marking, but were exposed to environment E1, which restricted their perfective and imperfective marking to past tense forms below their current developmental competencies: prototypical marking.

E2-NR Learners in this condition ($n = 13$) were not developmentally ready for non-prototypical past, but were exposed to environment E2, which restricted their perfective and imperfective marking to past tense forms ahead of their current developmental competencies: non-prototypical marking.

E2-RD Learners in this condition ($n = 17$) were developmentally ready for the use of non-prototypical marking and were exposed to environment E2, which restricted their perfective and imperfective marking to past tense forms in line with their current developmental needs: non-prototypical marking.

To test the effects of form-focussed multimedia past tense instruction and developmental readiness on L2 grammar acquisition in these four learning conditions, five hypotheses were formulated. With respect to the impact of instruction on past tense marking (i.e., research question 1), it was hypothesized that

H1: Form-focussed multimedia instruction on non-prototypical past tense will lead to more target-like use of past tense than form-focussed multimedia instruction on prototypical past.

With respect to the impact of developmental readiness on these two types of experimental past tense instruction, it was hypothesized that

H2: Form-focussed multimedia instruction on non-prototypical past tense among learners who are not ready for non-prototypical past will lead to changes in prototypical and non-prototypical past.

H3: Form-focussed multimedia instruction on non-prototypical past tense among learners who are ready for non-prototypical past will lead to changes in non-prototypical marking.

H4: Form-focussed multimedia instruction on prototypical past among learners who are not ready for non-prototypical past will lead to changes in this type of past only.

H5: Form-focussed multimedia instruction on prototypical past among learners who are ready for non-prototypical past will not lead to past tense changes.

Chapters 2 and 3 of this dissertation are devoted to theoretical and empirical evidence on the effects of multimedia instruction on L2 development and patterns of past tense acquisition among instructed L2 learners of French. Chapter 2 focuses on the potential of multimedia to facilitate L2 development through input and output opportunities. The conclusion of this chapter highlights the need of empirical evidence, to address the manner in which multimedia environments can influence L2 grammar development. To understand how multimedia instruction can scaffold learning of the French past tense in this doctoral study, Chapter 3 addresses the patterns of past tense development through which L2 learners of French have been hypothesized and documented to proceed and variables that appear to hinder these developmental patterns.

The chapter ends with a discussion of how multimedia instruction can control the variables that intervene in the acquisition of the past tense, and presents the research questions and hypotheses of the study.

Chapter 4 presents the method of the study, first describing the context in which the experiment was conducted, characteristics of the participants, the multimedia environments that were created for the study, and the experimental multimedia learning conditions. The chapter then provides a description of the past tense tests and treatment and classroom reports that were used to examine the effects of multimedia instruction. The chapter ends describing the implementation of the data collection instruments in the participating classes over the ten weeks of the experiment.

Chapter 5 presents the analyses and results of the data collected through the various instruments during the implementation of the treatment. Past tense results from each testing instrument are examined, first, for changes in the experimental groups' past tense scores, for the appropriate use of perfective and imperfective and for appropriate past tense use in prototypical and non-prototypical contexts. Results from the treatment and classroom reports are then presented in two subsections: one describes participants' attention to the multimedia lesson and the other focuses on the use of the target forms during regular classroom time in which learners were not working with the environment.

Chapter 6 provides the answers to the research questions. Building upon learners' use of the past tense prior to the treatment, the manner in which multimedia instruction facilitated learners' advancement through the predicted patterns of past tense development is discussed. Weaknesses and strengths of the multimedia treatment to assist learners' past tense development are then highlighted. Then, limitations of the study and future

research directions are discussed. The end of Chapter 6 highlights the contributions and implications of the current study to CALL and SLA theories and pedagogical practices that aim at the integration of multimedia in the foreign language class. Finally, Chapter 7 presents the conclusion of study.

CHAPTER 2

MULTIMEDIA AND L2 LEARNING

This chapter reviews theoretical and empirical evidence on the effects of multimedia instruction on L2 learning. Section 2.1 presents one key tenant for the integration of multimedia in L2 instruction. Section 2.2 reviews empirical evidence with respect to effects of L2 multimedia input on L2 development. Section 2.3 then reviews empirical evidence with respect to the use of multimedia to facilitate L2 production that could lead to interlanguage development. Finally, drawing on the evidence presented in the previous sections, section 2.4 highlights the potential benefit of integrating multimedia into the L2 classroom to facilitate L2 grammar development.

2.1. Multimedia and Second Language Instruction

In instructed SLA, a number of scholars have argued that input and output opportunities for L2 use foster opportunities for L2 classroom acquisition (see, for instance, Batstone, 1994; DeKeyser, 2007; Doughty & Williams, 1998; R. Ellis, 2003; Housen & Pierrard, 2005; Lightbown & Spada, 2006; VanPatten, 2004). In computer applications, these input and output opportunities can be created through tasks that integrate different media such as video, audio, static images and dynamic or static texts (Chapelle, 1998, 2001, 2003; Plass & Jones, 2005). As a result, in multi-media applications, L2 learners can be exposed to L2 opportunities in different modalities (e.g., written texts, audio files, static or motion pictures, and videos) and the combinations resulting from the use of two or more of these modalities at the same or distinct times (for

the use of different media combinations, see, for instance, Brett, 2000; Dlasaka, 2002; Kramsch & Andersen, 1999; Suzuki, 1996; Tsutsui, 2004).

Bret (2000), Chapelle (2001) and Plass and Jones (2005) point out that diversified L2 exposure opportunities fostered through multimedia may lead to changes in learners' interlanguage. Chapelle (2001, 2005) argues that during interaction with a computer environment, for instance, learners may become aware of L2 aspects that they need to develop, realize differences between their interlanguage and the L2, test hypotheses as to how the L2 works, and receive feedback on their use of the L2. Further, in line with arguments about the role of practice in L2 learning (e.g., DeKeyser, 1998, 2007; Lyster, 2004b; Ranta & Lyster, 2007), repeated exposure and attention to the L2 in multimedia meaning-oriented contexts can be hypothesized to help learners gain control over emerging aspects of their L2 systems.

The following sections review the theoretical bases for the role of input and output in L2 multimedia environments and illustrate, drawing on empirical evidence only, the manner in which aspects of multimedia instruction appear to facilitate L2 development from comprehension and production tasks.

2.2 L2 Multimedia Input

L2 input is essential for learners to advance their interlanguage. Drawing on Krashen's (1982) argument that the acquisition of a new language occurs through input which is slightly beyond learners' current comprehension capabilities (*i+1*), various multimedia investigations have examined the manner in which input available to learners in computer applications can be made comprehensible through the use of multimedia

features and the impact that such comprehensible input has on L2 development (Plass & Jones, 2005). In multimedia environments, the linguistic system that encodes information in the target language constitutes the L2 input. This input can be delivered through written or aural texts. To facilitate comprehension of these texts, features such as pictures, graphics, or videos are utilized, as these features provide visual descriptions or representations of the message encoded in the L2 (Brett, 1998).

2.2.1 Multimedia and Comprehension of L2 Input

Findings from computer-assisted language learning (CALL) investigations have shed light on the effects of multimedia at macro- and micro-levels of comprehension (Chun & Plass, 1996, 1997). At the macro-level, the results explain the effects of multimedia on comprehension of the information delivered through the L2. Reviews of multimedia studies seem to support the hypothesis that multimedia features can effectively assist learners' L2 comprehension during listening and reading tasks (Chun & Plass, 1996, 1997; Jones & Plass, 2002). Results suggest that representation of a message in different modalities (e.g., pictorial, aural, or written) triggers distinct comprehension processes. In turn, different media combinations can lead to different degrees of L2 input information decoding effectiveness. Overall, results seem congruent in that the combination of written information with pictorial descriptions appears to enable comprehension the best, in comparison to other media combinations. Chun and Plass (1997) explain that this combination triggers different comprehension processes, whereby learners can obtain complementary pieces of information, providing them with richer information on the content.

2.2.2 Multimedia and L2 Intake

At the micro-level, results explain the effects of multimedia in helping learners take in the L2 system with which information is encoded (i.e., words and L2 grammatical forms). Because the focus of this dissertation is on the effects of multimedia on L2 grammar development, further discussions of multimedia research will cover theoretical and empirical evidence at the micro-level only.

Empirical evidence shows that processing of verbal information (viz., written and aural) without multimedia assistance to make L2 input comprehensible may enable retention of L2 elements that learners encounter during comprehension tasks. Yet, it has been widely documented that the likelihood of learners taking in L2 forms increases when multimedia features direct learners' attention to linguistic elements encoding information in the multimedia input; this will be discussed shortly (see, for instance, Ariew & Ercetin, 2004; Brett, 1998; Jones & Plass, 2002; Mueller, 1980; Plass, Chun, Mayer & Leutner, 2003; Vanderplank, 1988). Plass and Jones (2005) indicate that in multimedia environments "comprehension of the semantic content of the apperceived input can be accomplished with or without an understanding of the syntax" (p. 470). When features such as textual or aural enhancement, captioning, and links to verbal or pictorial definitions are used to make linguistic forms stand out from the rest of the L2 input, however, the environment creates opportunities for the *noticing* (as defined by Schmidt, 1990) and *intake* (as defined by Corder, 1967) of these forms, fostering conditions for L2 acquisition (Brett, 1998; Chapelle, 2001; Plass & Jones, 2005). The following sections discuss how noticing and intake can be promoted in multimedia environments.

2.2.2.1 L2 Lexical Development

A number of studies have investigated the effects of various multimedia features to facilitate intake of L2 forms in different comprehension-based settings. Often, the impact of features such as multimedia annotations and textual enhancement has been examined on L2 learning in reading and listening multimedia environments. Other multimedia features such as text captioning and hotspots have been documented in video-based multimedia environments. The following sections present evidence on the effects of these multimedia features on L2 development.

Multimedia annotations consist of active links whereby learners can obtain further information about a word. This information can consist of a textual definition of a word, a pictorial representation of the word concept, or the combined use of text and pictures. It should be noted that active links that enable annotations also act as a type of typographical enhancement, which, in turn, makes target words perceptually salient. Depending on the nature of the multimedia environment, annotations may be provided in a new screen when learners click on a target word, or in the form of pop-ups that appear as learners place the cursor on the target word and disappear when the cursor is removed from the target word.

Yoshi and Flaitz (2002) examined the impact of three different annotation types to support vocabulary comprehension and retention from L2 written input in multimedia applications. A total of 151 English as a Second Language (ESL) learners from two levels of proficiency were assigned to a multimedia-based reading comprehension environment in which vocabulary support was provided (i) with pictures, (ii) with text or (iii) with text and pictures. A vocabulary pre-test showed that learners from both

proficiency groups were not familiar with the words targeted in the experiment. Results from analyses of variance revealed that participants exposed to the combined use of text and pictures had retained more vocabulary from the reading text than their counterparts in the other two multimedia conditions at post-test and delayed post-test times. Further, the analyses showed that multimedia had equally benefited learners from both proficiency levels, leading to no lexical gain differences between proficiency groups.

The benefit of the combined use of textual and pictorial annotations to facilitate L2 vocabulary learning has also been documented in listening comprehension-based multimedia applications. Jones and Plass (2002), for instance, examined the effects of four different multimedia conditions on text comprehension and vocabulary retention from aural L2 verbal input with 171 L2 learners of French. Participants were assigned to different listening environments with: (a) no multimedia support, (b) annotations in the form of textual definitions of the words, (c) annotations in the form of a pictorial representation of the word concept, or (d) annotations that integrated textual and pictorial definitions.

Prior to multimedia instruction, participants' lexical knowledge was tested using a vocabulary test. Analyses of variance showed no significant differences in vocabulary score means between groups at pre-test time. Post-test measures administered in the form of multiple choice vocabulary and recall protocols revealed poor comprehension among learners who had no multimedia support. Among learners who had received multimedia assistance, the highest comprehension and vocabulary scores were documented among learners who had been exposed to the combined use of textual and pictorial definitions. In a delayed post-test administered three weeks after the comprehension task, learners

who had received combined textual and pictorial support performed better on both measures in comparison to the other three groups.

In a different type of multimedia-based comprehension setting, Borrás and Lafayette (1994) examined the effects of textual support provided in the form of L1 captioning during a video-based comprehension task on learners' L2 input comprehension and retention and L2 production (the effects of captioning on L2 production in the study will be addressed in the multimedia-based output section). Captioning consisted of the English translation of the French dialogues in the video and learners could activate this function whenever they were not able to understand the dialogues.

A total of 44 college English-speaking learners of French were assigned to one of two video-watching conditions: captioning and no-captioning. In a post-test measure, learners in the captioning condition showed better comprehension of L2 forms present in the video than learners without captioning. It could be argued that learners using caption may not have understood the message from the L2 forms in the audio, but rather relied on the L1 translations provided in the captioning. However, Borrás and Lafayette (1994) reported that in a production post-test, caption learners exhibited richer use of the translated L2 forms present in the comprehension task than their counterparts. One potential interpretation of this finding is that learners may have 'picked up' meaning from the L1 caption and form from the video input. Rich use of the L2 translated forms suggests that learners had been able to map form and meaning of linguistic input present in the environment.

Other investigations into the effects of multimedia-based input have focussed on aspects of the L2 input itself that facilitate L2 gains. These studies have drawn on

arguments from SLA research that indicate that frequency of forms in the L2 input contribute to the mental representations that learners construct as to how the L2 operates and how much their own production differs from being target-like (e.g., N. Ellis, 2002; Lightbown, 2001; Sharwood-Smith, 1993).

Brett (1998) investigated the effects of word frequency in two multimedia CD-ROMs on the lexical development of 63 undergraduate learners of Business English. Participants were asked to use the CD-ROMs as self-study modules over a three-month period. The CD-ROM applications included video clips with transcripts provided in the form of captions; participants were in control of captioning. The environment also included hotspots, which consisted of highlighted words appearing on the video screen as they were used in the dialogues. Hotspot words were selected on the assumption that they were unknown to learners. In addition to the video clip, the CD-ROMs included activities and tasks, providing learners with opportunities to practice target language included in the videos.

At the end of the three months, learners were asked to write reports answering three questions related to the content of the CD-ROMs. The words that participants used in their written answers were compared to words included in the self-study modules. Brett (1998) found that words that were frequent in the environment were not necessarily present in learners' writing. He found, however, that learners had included in their writing those words which had appeared in the video captioning and hotspots. Brett concluded that learners had reused these words, because captioning and hotspots had made them perceptually salient, facilitating their noticing and intake.

In an earlier study, Brown (1993) had obtained similar results with respect to the effects of word frequency on lexical development, but she also found that essentialness of L2 forms for task completion in multimedia environments had facilitated L2 learning. Brown examined the effects of four aspects of the L2 forms present in the multimedia input on vocabulary learning: word frequency in the L2, word frequency in the multimedia environment, word use in two task conditions (glosses and exercises), and gapping (i.e., word essentialness for task completion). Over 100 ESL learners were pre- and post-tested on 180 words. Brown analyzed the number of participants who had learnt each word. Results revealed no effects of word frequency in the multimedia environment on lexical gains. However, the frequency of words in the L2 (as determined through an analysis of the Brown corpus) and essentialness of words for comprehension of the story presented in the multimedia environment did lead to mediating lexical gains.

In summary, investigations into the effects of different multimedia features to make input comprehensible and into the effects of word frequency in the L2 multimedia input provide evidence that L2 (lexical) forms that are present in L2 multimedia input during comprehension tasks do not necessarily become intake as a result of their (frequent) presence in the L2 input. Rather, procedures that push learners to notice these forms (e.g., enhancement and essentialness for task completion) in the L2 input do seem to enable their intake and productive use.

2.2.2.2 L2 Grammar Development

The studies previously presented focussed on the impact of multimedia on lexical gains, which is a growing area of L2 multimedia research. With respect to L2 grammar, the effects of different aspects of multimedia instruction (e.g., multimedia features,

frequency of L2 forms in the input, and L2 grammar essentialness during task completion) on comprehension and retention of L2 grammar have received less attention. However, some studies, which have opted for multimedia applications due to the high level of control that they facilitate over learning conditions, as some researchers have pointed out (Ayoun, 2001; Chapelle, 2001; Hulstijn, 1997), have shed light on multimedia features and conditions that seem to facilitate comprehension and retention of L2 grammar during input-based tasks.

Doughty (1991) investigated the effects of three computer-based learning conditions on the learning of prepositional relative clauses (e.g., *My brother broke the pencil that I was writing with*) with 21 ESL learners. The author divided her participants into three different groups, which were provided with reading passages containing relative clauses. In the passages given to two groups, relative clauses were highlighted using typographical enhancement. In addition to enhancement, one group received grammar explanation and one group received a restatement of the meaning of the relative clause. Participants, in each experimental condition, worked with the computer-based environment over ten days.

During a grammar post-test, groups with enhancement performed significantly better than the group without enhancement. However, the enhancement and sentence restatement group performed better than the enhancement and grammar explanation group. Results indicated that after the treatment, the enhancement-and-sentence-restatement learners had performed well not only with the type of relative clauses present in the L2 computer input (i.e., prepositional clauses) but also exhibited appropriate use of relative clauses which are hypothesized to be learnt prior to those present in the

environment (e.g., subject clause: *the person who drove the bus*; direct object clause: *the computer that I bought this morning*). Further, some learners showed appropriate use of relative clauses that are acquired once learners have achieved control over the forms present in the environment (i.e., comparative clause: *the person that John is richer than*).

Findings from Doughty's (1991) study suggest that typographical enhancement in the environment had made salient the target forms to both groups, but more effectively in combination with the sentence restatement. One possible interpretation of this finding is that typographical enhancement and grammar explanations in the grammar explanation group provided attention to one aspect of relative clauses only: structure. In the meaning restatement group, however, typographical enhancement may have attracted learners' attention to form while the restatement 'highlighted' meaning. This combination, in turn, led learners to map form and meaning during L2 comprehension. Since these conditions were held constant throughout the computer-based treatment, learners may have had sufficient opportunities to gain knowledge of the target forms and generalize it to less and more complex structures of the L2 target grammar.

More evidence on multimedia conditions that influence L2 grammar gains from L2 input comprehension comes from input-processing studies. VanPatten and his colleagues (Sanz, 2004; Sanz & Morgan-Short, 2004; VanPatten, 2002, 2004; VanPatten & Cadierno, 1993a, 1993b; VanPatten & Oikkenon, 1996; Wong, 2004a, 2004b) have argued that instruction that pushes learners to process form for meaning from the L2 input (i.e., input-processing instruction) benefits L2 development, as it enables learners to notice and build form-meaning connections while they are engaged in comprehension tasks.

In classroom (e.g., VanPatten, 1996; e.g., VanPatten, 2004; VanPatten & Cadierno, 1993a, 1993b) and computer-based research (Sanz, 2004; Sanz & Morgan-Short, 2004), the impact of input-processing instruction has been examined on the acquisition of preverbal pronouns by L2 learners in Spanish. Spanish allows the agent who performs an action in a sentence to be omitted; thus, in a sentence such as *ella llama a su hermano* (Subject + Verb + Object) “she calls her brother up”, the subject can be omitted and the resulting sentence would be *llama a su hermano* (Verb + Object) “*calls her brother up”; when the object of the sentence is an object pronoun, the object pronoun takes a preverbal position *lo llama* (Object + Verb) “*him calls up – she calls him up.” As a result, a challenge for learners of SVO languages (such as English), who process in a Subject+Verb+Object direction, is to understand the agent and recipient of an action in Object+Verb Spanish sentences (Sanz & Morgan-Short, 2004).

In a computerized environment, Sanz and Morgan-Short (2004) used pictures to help learners understand sentences in a story. In the target sentences, the agent of the action was dropped and the object pronoun appeared in a preverbal position (e.g., *las invita al cine* “*them invite to the cinema – he invites them to the cinema”). Each time a target sentence was presented, two pictures appeared on the screen. One picture correctly represented the action (i.e., a boy inviting two girls to the cinema). The other picture represented the opposite event (i.e., the girls inviting the boy to the cinema). Learners then had to carefully process meaning from form to be able to identify the picture that carried the meaning of the sentence. The picture-sentence processing task was supplied in four conditions: with or without [+/-] explanation, and with or without [+/-] feedback.

Results revealed significant differences from pre-test to post-tests in the comprehension and production of the target L2 grammar in all groups, but no significant between-group differences. The authors' interpretation of this finding was that the input processing nature of tasks, which had been held constant across all experimental conditions, led all groups to learn the form/meaning mapping that underpins the target form. Findings from Sanz and Morgan-Short (2004) and other input processing studies, along with those of Brown (1993), seem to corroborate that multimedia instruction which pushes learners to look for specific L2 forms and process them for meaning facilitates noticing and knowledge of L2 forms and the form-meaning connection that these forms hold.

In summary, multimedia environments that seem effective for L2 learning from L2 input exposure hold two main characteristics: first, they engage learners in meaning-oriented tasks and, second, they include features/conditions that push learners to notice the communicative value (i.e., meaning) of L2 forms and the L2 elements with which such a meaning is encoded (i.e., form). Evidence from Doughty's (1991) and Sanz and Morgan-Short's (2004) studies suggest that these two conditions need to be held constant, to provide learners with sufficient opportunities for form/meaning mapping development.

2.3 Multimedia and L2 Output

This section addresses L2 development promoted through multimedia-based output tasks. Swain (1998) argues that the generation of output is valuable for L2 acquisition (for counter arguments, see Krashen, 1998). She argues that through the generation of output, learners can attend to the manner in which the L2 operates (i.e.,

noticing); learners can realize lack of L2 knowledge to express something and the forms needed to achieve communication; they can make and test hypotheses as to how the L2 works (i.e., *hypothesis formulation and testing*), and talk about their own language (i.e., *metatalk*). Swain and Lapkin (1995) also point out that output gives learners opportunities to receive external indications of ill-formed language in their production (i.e., *feedback*); these indications are beneficial, because they can push learners to modify their output, and this modification of output may contribute to the restructuring of ill-formed aspects of their developing L2 grammar.

These hypothesized beneficial effects of output have led Chapelle (2001) and Plass and Jones (2005) to indicate that multimedia environments can be used to facilitate output opportunities in which L2 learning can be promoted. However, Chapelle (2001) and Plass and Jones (2005) acknowledge insufficient multimedia-based output research to support L2 development and to understand how the L2 learning conditions presented by Swain and Lapkin (Swain, 1998; Swain & Lapkin, 1995) could be enabled in computer applications in order to facilitate L2 acquisition. Yet, results from a small number of studies point to the potential of multimedia to facilitate attention to L2 forms in production tasks. Some of these studies are now reviewed.

2.3.1 Attention to Form in Multimedia-facilitated L2 Output

Edwards et al. (2002) illustrate the manner in which the integration of multimedia features in an environment called *Fabula* positively affects learners' immediate production. *Fabula* is a multimedia environment that allows for the creation of bilingual narratives. The narratives centre upon pictures and recordings that learners create, select, and upload to the environment. For each picture, learners write one paragraph, first, in

their L1 and, then, in their L2. After writing their paragraphs, learners need to compare the L1-L2 paragraphs to make sure the meaning in them is identical. Afterwards, learners produce audio recordings of their L1 and L2 paragraphs and upload them to the environment to accompany the written narratives.

According to Edwards et al. (2002), *Fabula* provides learners with multiple opportunities to focus on language use while they are engaged in meaning-oriented output opportunities. Conditions for attention to language occur repeatedly at various points in time: (a) when learners are generating their L2 paragraph, as learners may then notice that they are not able to encode something in the L2 and obtain help from their teachers; (b) when they compare their L1 and L2 paragraphs to make sure the meaning of the paragraphs is identical, as it is then that learners can notice differences in the use of L1-L2 forms to encode a message; (c) when learners produce their recordings, because at that point, they may notice ill-formed language in their paragraphs; and (d) finally, when learners negotiate L2 correctness with their peers and teachers.

2.3.2 L2 Development and Multimedia-facilitated Output

The effects of multimedia-based output conditions on the appropriate use/development of L2 grammar is an area of CALL research, which has yet to receive much research attention. The following two studies illustrate the potential of multimedia-based output to facilitate L2 knowledge gains.

In their study, in which Borrás and Lafayette (1994) looked at the impact of captioning on learners' attention and retention of L2 input, the authors also examined learners' use of the L2 in output tasks with varying levels of complexity: low or high. Task complexity depended on the amount and depth of information that students needed

from the video segment to produce two transactional tasks: a description and a narration. In each task, learners were assessed for content effectiveness, accuracy, organization and fluency. Learners from both captioning conditions were assigned to either low- or high-complexity level tasks.

Results from analyses of variance revealed that caption learners outperformed their counterparts in the effectiveness, accuracy, organization and fluency measures in both productive tasks. Further, learners in the captioning condition performed equally in all measurements irrespective of task complexity. These findings lend support to the argument that multimedia applications can be used to stimulate focussed L2 production, in which learners do not only attend to content, but also to language, thus facilitating learners' attention to L2 forms.

In a non multimedia-focussed study, Ayoun (2001) elicited the productive use of past tense markers in the French as a foreign language context using a sequence of pictures to construct a story, in order to measure the effectiveness of one feedback type (i.e., recasts) on the development of the perfective/imperfective distinction. Learners from three proficiency levels (low, mid, and high) were assigned to one of three output conditions: (a) *recast condition*: after the generation of a sentence with a wrong past tense marker choice, learners were provided with a corrected version of the sentence and then sent to the next computer screen (i.e., implicit negative feedback); (b) *model condition*: prior to production, learners received a model sentence (i.e., pre-emptive positive evidence); and (c) *grammar explanation*: prior to output, learners receive rules with respect to the use of past tense and when learners used a wrong past tense marker choice

in their output, they also received explicit explanations on the incorrectness of their past tense choice.

Participants were tested on their past tense use prior to and immediately after the computerized treatment, which was implemented over a three-week period during one-hour weekly sessions. These computerized conditions led to partial improvement of past tense use among participants in all output conditions irrespective of proficiency groups. Quantitative and qualitative results showed that the computer-based treatment had led to improvement in the use of the perfective past only, across all conditions. The computer treatment had no impact on the use of the imperfective past, however. Further, Ayoun (2001, 2004) found that changes in perfective had operated with some types of verbal predicates but not with others. Most verbal predicates that benefited from the computerized treatment were those with which perfective markers are hypothesized to emerge. The impact of the instructional intervention on L2 grammar development is relevant for this dissertation and will be further addressed in the section concerning the development of past tense in French.

To summarize this multimedia-based output section, research results lend support to the argument that multimedia-based output opportunities promote attention to form in meaning-oriented tasks, promoting noticing and immediate changes in ill-formed language. Two common aspects in these environments are, first, the output that learners are to generate is primed through the use of multimedia elements, such as video or pictures. This priming provides learners with a message to encode in the L2. Second, as learners engage in encoding a message, attention to their appropriate use of the L2 is

facilitated through multimedia features, such as captioning or computer feedback, or through peer or teacher collaboration.

2.4. Multimedia and L2 Grammar Instruction

When one looks at the assumption that L2 grammar acquisition could result from the interaction of learners with multimedia environments, one finds robust evidence on lexical development, pedagogical and technological suggestions, but little empirical evidence to address such an assumption (e.g., Fotos & Browne, 2004; Groß & Wolff, 2001; Heller, 2005; G. Murray, 1999; L. Murray & Barnes, 1998).

As Chapelle (2001) and Hulstijn (1997) have pointed out, most studies in which multimedia environments have been utilized to investigate L2 grammar acquisition have relied on this type of computerized environments due to the high level of control that researchers can have over the L2 grammar present in the L2 input and experimental learning conditions participants are exposed to (e.g., positive versus negative feedback: Ayoun, 2001; implicit versus explicit learning: DeKeyser, 1995; Robinson, 1996; input processing conditions: Sanz, 2004; Sanz & Morgan-Short, 2004). But, very few investigations have focussed on the potential of multimedia instruction itself to facilitate L2 grammar acquisition; they have not addressed the manner in which the multimedia environments may constitute a valuable instructional tool to assist L2 grammar changes. Yet, evidence from the studies previously reviewed on the effects of multimedia on L2 input comprehension and vocabulary development, and results from a few investigations into L2 grammar learning and multimedia-based output, make two important contributions to multimedia research and to this dissertation study.

First, they show the benefit of integrating multimedia environments in L2 learning. But, congruent with arguments by Sharwood Smith (1981, 1986), for instance, one condition for learning of L2 (lexical and grammar) forms to occur from multimedia exposure is that computer applications promote attention to specific aspects of the L2 input/output, facilitating noticing and intake of the forms that learners need to advance their interlanguage.

One effective way to promote noticing and intake of new lexical items is through the combined use of pictures and texts. Chun and Plass (1997) hypothesize that simultaneous presentation of words in the form of texts (i.e., the linguistic form) and the pictorial representation of their concept (i.e., meaning) facilitates mapping and storage of these two aspects of words.

With respect to L2 grammar noticing and intake, results suggest that environments which make the target linguistic input stand out and provide learners with continuous opportunities to deal with form and meaning during input-based comprehension tasks, may promote the learning of form/meaning connections. Similarly, multimediated output-based studies suggest that when conditions for attention to the L2 are fostered in multimedia, learners may focus on the appropriate use of the L2. In turn, attention to language may facilitate immediate retention and appropriate use of L2 forms.

The extent to which newly gained L2 knowledge may promote permanent changes in learners' interlanguage systems remains unknown, due to an absence of empirical evidence with respect to changes in the interlanguage of L2 learners. In some of the studies previously reviewed, first, there are neither records of the forms that learners retained from the environment nor indications of non-target-like use of L2 forms

in the linguistic resources of the learners prior to multimedia exposure (e.g., Borrás & Lafayette, 1994; Edwards et al., 2002). In other studies, in which a linguistic target was identified prior to and immediately after instruction, there are no records, at later points in time, of the productive use of the forms to which learners attended in the environment (e.g., Ayoun, 2001; Ayres, 2002; Doughty, 1991; Sanz, 2004). Therefore, it remains unknown whether the knowledge that learners gained from the multimediated instruction led to long-term changes in their interlanguage.

There is evidence from a larger body of instructed L2 acquisition research, namely research on form-focussed instruction (R. Ellis, 2001), that planned or incidental instruction that pushes learners to attend to the manner in which form-meaning connections appear in the L2 input and occur in output opportunities available to learners, benefit the emerging L2 system of the learners. This is because this type of L2 instruction pushes learners to perceive the manner in which their interlanguage differs from the L2. The new resulting knowledge, in turn, may promote changes toward target-like form-meaning mappings (see also Batstone, 1994; Celce-Murcia & Larsen-Freeman, 1999; R. Ellis, 2001; Ellis, Basturkmen & Loewen, 2001; Lightbown, 1985a, 1985b, 1998; Lyster, 1994, 2004b; Schmidt, 1990; Sharwood-Smith, 1981, 1993; Skehan, 1998; Swain, 1993, 1998; VanPatten & Cadierno, 1993a).

The impact of form-focussed instruction on L2 learning has become the object of research in classroom-based studies in French immersion programs (e.g., Harley, 1998; Lyster, 1994, 2004b), intensive English as a Second Language (e.g., Lightbown & Spada, 2000; Spada, Lightbown & White, 2005; White, 1998) and foreign language learning contexts (e.g., Alegría de la Colina & García-Mayo, 2006; White, Muñoz & Collins, in

press) and the manner in which this type of instruction can be fostered through input and output opportunities (see, for instance, Ammar, 2003; White, 1996). In multimedia L2 research, however, the effects of form-focussed instruction on L2 grammar learning have yet to receive much attention (for a discussion on the need of this type of research, see Skehan, 2003).

The second major contribution from existing literature to the development of this doctoral dissertation is that computer-based instruction seems to have led to L2 grammar knowledge gains within patterns of L2 grammar development in Doughty's (1991) and Ayoun's (2001) studies. Pienemann (1999) has indicated that prior to the stabilized target-like use of specific L2 grammar forms, learners proceed through a series of predictable stages, which are characterized by the recurrent generation of particular linguistic patterns. Pienemann (1987) points out that investigations into the acquisition of an L2 need to examine the influence that instruction can have on patterns of L2 grammar development.

Analyses of Doughty's (1991) and Ayoun's (2001) results within a developmental approach suggest that computer environments can help learners proceed through patterns of L2 grammar development. Doughty's (1991) study revealed that learners who gained knowledge of the forms targeted in the computer environment, also showed knowledge of forms that precede the acquisition of the target forms. Still, more relevant is the finding that some learners were able to generalize knowledge of the target forms to structures that are acquired after those present in the environment.

In Ayoun's (2001) study, the computer treatment did not lead to learning of both past tense markers. Analyses of learners' past tense marking prior to and after the

treatment revealed that learners benefited from instruction in the use of perfective while no changes occurred with imperfective and that computer instruction led to the use of perfective mostly with verbal predicates associated with its emergence as documented in previous research (e.g., Harley, 1992; Harley & Swain, 1978). In addition, the analyses revealed that the imperfective was almost exclusive to verbs such as *avoir* “to have” and *être* “to be” as it has been documented in previous observational studies (e.g., Harley, 1992; Harley & Swain, 1978). These results suggest that multimedia instruction seems to have accelerated the emergence of the perfective and imperfective aspects respecting the natural order of past tense development through which learners have been documented to proceed.

Because instruction that drives learners' attention to form-meaning connections during multimedia-based L2 comprehension or production tasks (i.e., form-focussed multimedia instruction) may operate within patterns of L2 past tense development, it is essential to become aware of those patterns in order to be able to capture and explain changes in the L2 grammars of multimedia courseware users.

Following the design of previous classroom instructed SLA research conducted within a developmental framework (e.g., Ammar & Lightbown, 2005; Spada et al., 2005; Spada & Lightbown, 1999; White, 1996, 1998; White et al., in press), the following information is needed to investigate the effects of multimedia on L2 acquisition: first, the patterns of development that underpin the acquisition of L2 forms; second, learners' stage of development prior to form-focussed multimedia instruction; third, the developmental proximity of L2 forms present in the environment in reference to the learners' current stage of development; and, fourth, the developmental stage at which learners may be, not

only immediately after instruction, but also at later points in time. To provide a framework to analyze the effects of multimedia instruction on the development of L2 grammar in this dissertation, Chapter 3 presents theoretical and empirical evidence on developmental patterns of past tense marking documented among learners of French of different ages in various instructional contexts.

2.5. Chapter Summary

Learners seem to construct L2 knowledge during their interaction with multimedia environments provided these environments systematically help learners attend to and process the form-meaning connections that underpin L2 forms (i.e., form-focussed multimedia instruction). With respect to L2 grammar, knowledge gain that results from form-focussed multimedia instruction may be mediated by the current stage of acquisition of the learners. Questions remain, however, with respect to the impact that the newly gained L2 knowledge has on the advancement of learners' interlanguage system. Therefore, further research is needed to address the manner and degree to which multimedia instruction can help learners move beyond their current interlanguage stage.

CHAPTER 3

PAST TENSE ACQUISITION IN FRENCH L2

This chapter addresses the area of L2 grammar targeted in the present study to investigate the effects of multimedia instruction on L2 grammar acquisition: past tense marking in French L2. This area of grammar was chosen to be the target of the form-focussed multimedia instruction because its development has been documented to be notoriously difficult. This may be, at least in part, due to the effects of variables over which technology may be able to provide some control.

Section 3.1 describes past tense marking in French and Spanish, the target- and first language of the participants accordingly. Operating on predictions of the Aspect Hypothesis (Andersen & Shirai, 1994), Section 3.2 introduces the hypothesized and documented patterns of past tense marking through which learners appear to acquire perfective and imperfective forms. Finally, Section 3.3 addresses variables that appear to hinder these patterns of development.

3.1. Tense and Grammatical Aspect in French L2

Placing events in time and depicting their manner of occurrence is essential for achieving communication (Shirai, 2004). French and Spanish are Romance languages that encode these notions with *temporal morphology* (i.e., bound morphemes; e.g., French: *je travaillerai demain*, Spanish: *trabajaré mañana* “I will work tomorrow”) and periphrastic expressions (e.g., French: *je viens de manger*, Spanish: *acabo de comer* “I just ate”). Only the use of temporal morphology is covered in this dissertation. For the use and development of other discourse forms to mark L2 tense and aspect, see Bardovi-Harlig (2000). The following sections introduce the notion of tense and grammatical

aspect. Then, the manner in which French marks the past tense perfective and imperfective distinction through verbal morphology is explained.

3.1.1 Tense

Sentences in Table 3.1 refer to the same action: *leaving at 8:00*; yet, due to differences in the moment in time when the action occurs in reference to the current moment of speech differs, they differ in tense (Comrie, 1985; Klein, 1994).

Table 3.1.

<i>Tense-aspect Marking in French and Spanish</i>		
French	Spanish	English translation
Absolute tenses		
Past		
1. Je <u>suis</u> parti à 8h00	Partí a las 8	I left at 8:00
2. Je <u>partais</u> à 8h00	Partía a las 8	I would leave/ was leaving at 8:00
Present		
3. Je <u>pars</u> à 8h00	Parto a las 8	I leave/ am leaving at 8:00
Future		
4. Je <u>partirai</u> à 8h00	Partiré a las 8	I will leave at 8:00
Relative tenses		
5. J'étais parti pour le Mexique, quand elle est arrivée	Había partido para México cuando ella llegó	I had left for Mexico, when she arrived
6. Je serai parti pour le Mexique quand elle arrivera	Habré salido para México para cuando ella llegue	I'll have left for Mexico by the time she arrives

Sentences 1 and 2 are in *past tense*, as they occur prior to the current moment of speech. Sentence 3 presents an action overlapping with the current moment of speech; it is in *present tense*. Sentence 4 is in *future tense*, as the action occurs after the current

moment of speech (Klein, 1994; Weist, 2002). Sentences 1 through 4 directly use the current moment of speech as a time referent, thus, they are in *absolute tenses* (Binnick, 1991). Sentences 5 and 6 where the event of *leaving for Mexico* takes a referent other than the current moment of speech, are called *relative tenses* (Binnick, 1991). For further discussion on absolute and relative tenses see, Klein (1994) and Weist (2002).

3.1.2 Grammatical Aspect

In Table 3.1, Sentences 1 and 2 locate the event of *leaving at 8:00* in the past tense, but diverge in grammatical aspect, since the manner in which the action is presented differs (Comrie, 1976). Sentence 1 marks the action as a terminated event (i.e., *perfective aspect*), while Sentence 2 describes how the action unfolds (i.e., *imperfective aspect*). French and Spanish encode these aspects with different sets of verbal morphology or morphological markers and their functions are mutually exclusive in both languages; that is, perfective morphology cannot be used to render functions of imperfective morphology and vice versa (for details, see, for instance, Ayoun, 2005; Kihlstedt, 2002).

3.1.2.1 Perfective

French renders perfective with two different sets of verbal morphology known as *passé simple* and *passé composé*. Spanish marks perfective with *pretérito*. *Passé simple* is similar to *pretérito* in form and meaning, but not in usage. *Passé simple* is relatively rare in everyday spoken and written discourse; it is more common in literary writing (Ayoun, 2005; O'Connor Di Vito, 1995). Thus, *passé simple* receives limited pedagogical

attention in the communicative language class¹. *Pretérito*, however, is used in both daily and literary discourse. The study reported on here focussed on the *passé composé* perfective in L2 French acquisition.

Passé composé is a compound form in French and requires an auxiliary (i.e., *être* or *avoir*) and the past participle of the main verb, and in some cases, gender and number agreement between the past participle and the head noun phrase. *Pretérito* is marked with bound morphemes in the main verb in agreement with the head noun phrase. In modern French, *passé composé* is not exclusive to perfective; it is also used in perfect contexts. In perfective contexts, *passé composé* treats the situation as a whole, with a start and termination point in the past tense (Abrate, 1983; Kihlstedt, 2002) as in the sentence: '*j'ai vu ce film hier soir*' (I saw this film last night) (Collins, 2004, p. 256), where the action of *seeing a film* is marked as completed and located in a specific moment in the past. In perfect contexts, however, *passé composé* locates a completed action in an indefinite point in time between the past and the present, as in the sentence '*j'ai vu ce film*' (I have seen this film) (Collins, 2004, p. 256), where the action of seeing the film is perceived as completed, but the specific moment/s in which it was done is not defined. In this dissertation, unless otherwise indicated, *passé composé* will refer to perfective contexts.

3.1.2.2 Imperfective

French renders imperfective with *imparfait* and Spanish marks it with *copretérito*. Both are marked with inflections in the main verb of a sentence in agreement with the

¹ Teaching of *passé simple* to the populations of the study reported on in this paper occurs in the last unit of the last level of French, and as an aid to reading comprehension only. Learners are not required to produce it at all.

head noun phrase. Imperfective depicts the internal structure of an event occurring without time boundaries (Comrie, 1976; Kihlstedt, 2002). In comparison to the perfective, the imperfective is much more nuanced.

Table 3.2

Imperfective Values in French and Spanish

Value	Lang	Example
Habitual	French	<i>Dans les années 80, les banques mexicaines <u>fermaient</u> à 15h00</i>
	Spanish	<i>En los 80s, los bancos en México <u>cerraban</u> a las 3 de la tarde</i> “In the 80’s, Mexican banks close- <u>imperfective</u> at 3 pm”
Frequentative	French	<i>À Paris, j’<u>allais</u> me promener aux Champs-Élysées</i>
	Spanish	<i>En Paris, <u>iba</u> de paseo a los Campos Elíseos</i> “In Paris, I go- <u>imperfective</u> for walks on the Champs-Elysees”
Progressive	French	<i>Hier, je travaill<u>ais</u> quand ma sœur est arrivée.</i> “Yesterday, I work- <u>imperfective</u> when my sister arrive-perfective”
	Spanish	<i>Ayer, <u>estaba</u> trabajando cuando mi hermana llegó</i> “Yesterday, I work- <u>progressive</u> when my sister arrive-perfective”
Continuous	French	<i>À Berlin, j’<u>habitais</u> au quartier Charlottenburg</i>
	Spanish	<i>En Berlín, viv<u>ía</u> en el sector Charlottenburg</i> “In Berlin, I live- <u>imperfective</u> in the borough Charlottenburg”

Building on classifications of the French and Spanish perfective and imperfective values presented by some researchers (Abrate, 1983; Ayoun, 2005; De Lorenzo Roselló, 2001; Howard, 2001; Kihlstedt, 2002; Salaberry, 2000), Table 3.2 illustrates the French and Spanish imperfective values. For French, the imperfective values can be summarized as (a) habitual, (b) frequentative, (c) continuous, and (d) progressive; for Spanish the imperfective values can be summarized as (a) habitual, (b) frequentative, and (c) continuous. The progressive value in Spanish, however, is rendered with *pasado progresivo*, but it can also be expressed through imperfective morphology in spoken discourse, depending on the Spanish variety.

Both the habitual and frequentative values of the imperfective depict the consistent occurrence of an event over time, but they differ in the degree of the frequency with which the action occurs. In comparison to the habitual value, the frequentative function of the imperfective depicts an action occurring less often. In Table 3.2 the action of *closing at 3 pm* takes place repeatedly as an established pattern, whereas the action of *going for a walk on the Champs-Élysées* occurs inconsistently, yet repeatedly (for further details, see De Lorenzo Roselló, 2001; Howard, 2001; Kihlstedt, 2002).

The progressive and continuous values of the *imparfait* highlight continuity in the course of an event. The difference between them, however, is the time period for the duration of the event. In the progressive value, the duration of the event spreads over time until a definite point in time. In Table 3.2, for instance, the action of *working* unfolds until the occurrence of a new event: *someone's arrival*. The continuous value, however, indicates that an action unfolds over time without interruption, as in the action

of *living in Berlin*, which extends over an indefinite period of time (for further details, see De Lorenzo Roselló, 2001; Howard, 2001; Kihlstedt, 2002).

3.2. The Aspect Hypothesis and the Acquisition of the French Past Tense

One approach to understanding how learners acquire the perfective/imperfective distinction comes from explanations of the Aspect Hypothesis (Andersen & Shirai, 1994; Andersen, 2002). The Aspect Hypothesis states that learners proceed through a series of stages in the acquisition of past tense markers, operating on similarities and differences between the inherent semantic properties of verbal predicates (i.e., lexical aspect) and the functions of tense-aspect markers. The following sections explain the semantic properties of verbal predicates and the patterns of past tense development that they are predicted to cause.

3.2.1. *Lexical Aspect*

Lexical aspect refers to properties inherent in the meaning of verbal predicates. For the purpose of this thesis, Andersen's (1991) classification will be used. Table 3.3 illustrates these lexical properties: telicity, dynamicity and punctuality and the four aspectual categories of verbal predicates that result from their combination: statives, activities, accomplishments, and achievements (Andersen, 1991).

Telicity refers to temporal boundaries in the meaning of verbs. Verbs can be classified as *telic*, if they have an inherent endpoint, or *atelic*, if the inherent endpoint is absent. Telicity, however, does not depend exclusively on the inherent meaning of verbs. Some verbs can be either telic or atelic depending on the situation they describe (Comrie, 1976; Mourelatos, 1981). The action of *walking* in the sentences *I walked in the woods*

and *I walked one kilometre in the woods* changes its telic properties due to the predicate that comes with it. In the first sentence, the predicate (i.e., in the woods) does not establish an inherent end to the action; that is, it remains undetermined when the action ceases to occur, and thus, with this predicate the verb remains atelic. In the latter sentence, however, the predicate (i.e., one kilometre in the woods) announces an end for the action of walking when the person completes one kilometre, and thus, with this predicate, the action of walking holds a telic property.

Table 3.3.

Aspectual Categories (after Andersen, 1991)

Verbal category	Semantic features		
	Dynamicity	Telicity	Punctuality
<u>Statives</u>			
<i>Ivar aime le Mexique</i> Ivar likes Mexico	No	No	No
<u>Activities</u>			
<i>Isabel travaille à l'université</i> Isabel works at the university	Yes	No	No
<u>Accomplishments</u>			
<i>Andrea a bu deux bières</i> Andrea drank two beers	Yes	Yes	No
<u>Achievements</u>			
<i>Danièle arrive toujours de bonne heure</i> Danièle always arrives early	Yes	Yes	Yes

Dynamicity is a semantic property determining whether energy is required to perform the action. Activities, accomplishments and achievements require energy input, and thus, they are called *dynamic verbs*. Statives are *not dynamic*.

Punctual verbs, such as the verb *arrive*, occur instantaneously and usually mark the beginning or end of an event, as in the predicates *to start the race*, *to finish a test*, *to win a competition* (Andersen, 1991).

Table 3.3 shows that the various combinations of these three lexical properties result in four types of verbal predicates or aspectual categories: statives, activities, accomplishments and achievements. Verbs in the stative category are not dynamic, telic, and punctual (e.g., in French *être* “to be”, *avoir* “to have”, *sentir* “to feel”). Activities are neither telic nor punctual, but they are dynamic (e.g., *manger au restaurant* “to eat at a restaurant”, *marcher dans la forêt* “to walk in the woods”, *porter* “to wear”). Accomplishments are telic and dynamic, but they are not punctual (*visionner un film*, “to watch a film”, *nager un kilomètre* “to swim a kilometre”, *lire un chapitre d’un livre* “to read a book chapter”). Finally, achievements are telic, dynamic, and punctual (e.g., *casser* “to break”, *arriver* “to arrive”, *tomber* “to fall”).

3.2.2. Predicted Patterns of Past tense Development

As it was indicated earlier, the Aspect Hypothesis states that learners proceed through a series of stages in the acquisition of past tense markers, operating on similarities and differences between the inherent semantic properties of verbal predicates and the functions of tense-aspect markers. The aspect hypothesis makes three predictions for the development of past tense marking in languages that mark the perfective and imperfective distinction (Andersen, 2002; Andersen & Shirai, 1994; Bardovi-Harlig, 2000). First, learners attempt the productive use of the perfective, and then that of the imperfective. Second, perfective emerges with achievements, and then spreads through accomplishments, activities, and statives. Third, imperfective emerge with statives, and

then spreads through activities, accomplishments, and achievements. The following sections illustrate the predicted use of perfective and imperfective at early and late stages of past tense marking.

3.2.2.1. Predicted Early Past Tense Marking

Perfective and imperfective are hypothesized to emerge in *prototypical contexts*; these are contexts in which the semantic properties of verbal predicates and the functional values of tense-aspect markers align (Howard, 2001). Perfective is predicted to emerge with telic predicates, because in these predicates it is possible to establish an end point to the action. Specifically, perfective is hypothesized to emerge with achievements, and then to spread to accomplishments, as shown in Examples 3.1 and 3.2.

Example 3.1

Perfective with achievements

<i>J'ai fermé la porte</i>	[I close-PER the door]
<i>Elle est arrivée tôt</i>	[She arrive-PER early]

Example 3.2

Perfective with accomplishments

<i>J'ai marché un kilomètre</i>	[I walk-PER one kilometre]
<i>Il a écrit deux lettres</i>	[He write-PER two letters]

At early stages of past tense marking, imperfective is hypothesized to emerge with atelic predicates, as with these predicates, it is not possible to establish an end point to the action. Imperfective is predicted to emerge with statives, and then, to spread to activities, as in Examples 3.3 and 3.4.

Example 3.3

Imperfective with statives

<i>Je semblais content</i>	[I seem-IMP happy]
<i>Il pensait à elle</i>	[He think-IMP of her]

Example 3.4

Imperfective with activities

<i>Je travaillais à l'université</i>	[I work-IMP at the university]
<i>Marie regardait la télé</i>	[Mary watch-IMP TV]

3.2.2.2 Predicted Advanced Past Tense Marking

With the increase of past tense knowledge, the prediction is that learners start supplying perfective and imperfective markers in *non-prototypical contexts*; these are contexts in which the functional values of perfective and imperfective do not align with the inherent semantic properties of verbs (Howard, 2001). Thus, at an advanced stage, learners are hypothesized to use perfective to indicate completeness with predicates in which it is not possible to establish an end point to the action, such as activities and statives, as illustrated in Examples 3.5 and 3.6.

Example 3.5

Perfective with activities

J'ai travaillé à l'université [I work-PER at the university]

Marie a regardé la télé [Mary watch-PER TV]

Example 3.6

Perfective with statives

J'ai semblé content [I seem-PER happy]

Il a pensé à elle [He think-PER of her]

At late stages of tense-aspect marking, learners are predicted to use imperfective to describe the manner in which actions take place with predicates in which it is possible to establish an end point to the action (i.e., telic predicates). At this stage learners are hypothesized to extend their use of imperfective to accomplishments and achievements, as in Examples 3.7 and 3.8.

Example 3.7

Imperfective with accomplishments

Je marchais un kilomètre [I walk-IMP one kilometre]

Il écrivait deux lettres [He write-IMP two letters]

Example 3.8

Imperfective with achievements

Je fermais la porte [I close-IMP the door]

Elle arrivait tôt [She arrive-IMP early]

3.3 Documented Patterns of Past Tense Development in French L2

Among L2-instructed learners of French, two consistent findings with respect to the acquisition of the past tense are that perfective and imperfective are acquired at different rates (perfective emerging before imperfective) and that they are distributed differently across verb types. The following sections provide empirical evidence on the development of the perfective and imperfective distinction from studies conducted with instructed L2 learners of French in various instructional contexts.

3.3.1 Past Tense Emergence

Congruent with predictions of the aspect hypothesis, cross-sectional studies of child and adult learners of L2 French in different classroom contexts show that perfective past emerges before imperfective. In Canadian French immersion programs, Harley and Swain (1978) analyzed the verb system of five children from a grade five class during a 20-25 minute interview. Their reports showed that these learners supplied the perfective twice as often as the imperfective in comparison to a group of three bilingual children of French-speaking home background and a group of three unilingual French-speaking children. Similarly, Kaplan (1987) examined the use of tense and aspect by adult university learners from beginning and intermediate proficiency levels during a 10-minute semi-structured interview. The results from this study also showed that learners from both groups used perfective more often than imperfective. Perfective was used with a range four times as great as that of the imperfective.

These findings were confirmed in a later study carried out by Harley (1992). In a cross-sectional study, Harley observed the verbal systems of learners from three different grade levels (1, 4, and 10). Among grade-one learners, perfective operated as the default

grammatical aspect with dynamic verbs; the imperfective was recurrent with *avoir* and *être* only. The rate of imperfective marking slowly increased among learners in grade four and ten. Yet, the perfective remained the preferred tense-aspect with dynamic verbs, causing a slow spread of the imperfective within these verbs.

3.3.2 Perfective and Imperfective Development

Various studies on the acquisition of French have provided evidence of tense-aspect markers emerging in prototypical contexts, but these studies have also shown L2 learners' resistance to using tense-aspect markers in non-prototypical contexts.

In a cross-sectional study with learners from four proficiency levels, Bardovi-Harlig and Bergström (1996) observed the spread of temporal morphology through a written narrative among foreign language learners of French. Among the lowest proficiency group, the largest number of perfective instances occurred with achievements (63%), followed by accomplishments (50%), and activities (26%). Perfective marking emerged with states (13%) in proficiency level two. Across upper levels, the rate of perfective with statives remained low, whereas that with achievements and accomplishments was high. These findings were further corroborated by Salaberry (1998), who found that in comparison with French native speakers (hereafter Francophones), L2 learners supplied perfective marking with statives less often in obligatory contexts contained in a cloze passage and a written narrative.

Concerning the spread of imperfective marking, Bardovi-Harlig and Bergström (1996) reported patterns of imperfective development similar to those found by Harley and Swain (1978) and Harley (1992). Early attempts to supply imperfective occurred with statives within the lowest proficiency group (Group 1; 25%). Even within states,

imperfective marking emerged with a limited number of predicates, mainly *être* and *avoir*. Within dynamic verbs, imperfective scarcely emerged in group 2 (activities: 5%; accomplishments: 5.6%; achievements: 4.3%). Increase in the rate of imperfective marking with dynamic verbs continued within the more proficient groups (Group 3 and 4); yet it was slow. In a later study, Salaberry (1998) also found that in comparison to Francophones, L2 learners were operating with limited use of imperfective in terms of rate and number of predicates. They also showed more reliance on the imperfective forms of *être* and *avoir* than participants in the Francophone group.

Investigations with more advanced learners of French also demonstrate the influence of lexical aspect, resulting in low non-prototypical marking (i.e., perfective with atelics and imperfective with telics) even in obligatory contexts. Howard (2001), for instance, investigated the effects of living in a French-speaking country on non-prototypical marking by three groups of intermediate learners during a one-hour interview. Groups 1 and 2 had two years of French instruction in Ireland. Participants in Group 2 completed an additional year in France. Group 3 completed three years of instruction in Ireland. Between-group comparisons revealed that the study-abroad group increased the use of the various functions of the imperfective, as well as the appropriate use of tense-aspect markers in obligatory contexts but maintained the preference for the perfective as well as for the perfective-telic and imperfective-atelic associations that characterise the emergence of temporal morphology.

In summary, the studies previously reviewed support the aspect hypothesis in that (a) the perfective is used earlier and faster among dynamic verbs than the imperfective; and (b) prototypical marking characterizes the emergence of temporal morphology. But

they do not point to a full development of tense-aspect marking, because across proficiency levels, there is (a) a limited use of imperfective marking, resulting from the preference of perfective marking with dynamic verbs, and (b) a continuous reluctance for non-prototypical marking.

3.4 Challenges in Past Tense Development

In addition to lexical aspect, the acquisition of past tense may also be hindered by the functional complexity of the perfective and imperfective forms, cognitive factors, the nature of the L2 input, L1 influence, and instructional limitations. The following section reviews these challenges.

3.4.1 Form-function Mapping Complexity

Kaplan (1987) argues that, from a morpheme acquisition approach, learners would be expected to supply imperfective first, more often, and accurately, because its morphology is less complex than that of the perfective. Yet, empirical evidence clearly shows learners consistently attempting the perfective more often than the imperfective, despite morphosyntactically inaccurate use (Harley & Swain 1978; Harley, 1992; Kaplan, 1987). Furthermore, the number of predicates marked with perfective appears to increase rapidly with dynamic verbs over time and as a result of instruction, whereas that of the imperfective does not (e.g., Ayoun, 2001, 2004).

Differences in the functional richness between perfective and imperfective may facilitate perfective over imperfective use (Ayoun, 2005; Harley, 1992; Harley & Swain, 1978; Kaplan, 1987). In contrast to perfective, imperfective is more challenging, as it covers a wide array of functions (habitual, frequentative, continuous, progressive) that

learners need to retrieve and differentiate as they mark tense and aspect (Andersen, 2002). Andersen suggests that at early stages of tense-aspect acquisition, learners may operate on a one-to-one basis concerning form-function mapping of temporal morphology. There is empirical evidence to support this claim. Harley (1992) shows that the more advanced learners supplied imperfective to mark progression with some dynamic verbs, but not habituality or frequentation. Similarly, Ayoun (2004) reported that in their compositions, participants appeared to have limited the use of imperfective to its progressive value, and that the learners did not improve in the use of imperfective to express iteration (i.e., frequentation) despite instruction.

3.4.2. L2 Input

One more aspect that seems to confine the development of past tense markers relates to the frequency of perfective and imperfective markers in the L2 input (Ayoun, 2004; Harley, 1989). Analyses of tense-aspect/mood marking in teachers' discourse in the immersion and foreign language contexts have lent support to the argument that these two grammatical forms are less frequent in the L2 input than other L2 forms (see, for instance, Lyster, 2007). In addition, in comparison to imperfective forms, perfective ones appear more often, and hence, they may be more noticeable.

In an examination of over 28 hours of teacher discourse in French immersion programs in Ontario, Harley, Allen, Cummins and Swain (1987) found that past tense occurred with 15% of all verbs analyzed, whereas teachers had used present tense in 75% of the cases. To further examine the distribution of tense-aspect/mood in immersion classrooms, similar numbers of classroom discourse hours were analyzed for the development of this doctoral dissertation. This corpus, referred to in Lyster (2007),

included 17,892 tokens generated during 28 hours by six teachers in the French immersion context in Québec.

Results showed that out of 14 distinct types of tense-aspect/mood markers, perfectives ranked second in frequency (8.22%), whereas imperfectives ranked fourth (5.04%) (see Appendix A for a detailed presentation of tense-aspect/mood markers by teachers). Individual analyses of each teacher's discourse showed that five out of the six teachers used perfective much more frequently than imperfective. This distribution of tense-aspect/mood was similar to that reported in immersion classrooms in Ontario (Harley, Allen, Cummins & Swain, 1987; Swain, 1996; Swain & Carroll, 1987). Similarly, in the foreign language classroom, Kaplan (1987) analyzed a small amount of teacher discourse and found a robust disparity in the rate between perfective and imperfective. Perfective markers were used in 87% of the past contexts.

Harley (1986) and Lyster (2007) highlight that, in some cases, imperfective morphology is phonologically difficult to differentiate from other forms and, thus, it can be hypothesized that the possibilities for learners to contrast grammatical aspect in oral input are reduced (see also Blyth, 2005). This lack of phonetic contrast may hinder learners' development of the L2 system, as they may not be able to perceive occasions where grammatical aspect appears in non-prototypical contexts as in the following example. Orthographically, the non-prototypical use of imperfective in the sentence *je quittais mon travail* "I leave-imperfective my job" can be differentiated from the prototypical use of perfective in the sentence "*j'ai quitté mon travail*" "I leave-perfective my job". However, this differentiation in oral input is not easy, as the pronunciation of

the sentences is very close: /jɛkite/ versus /jəkite/, especially so in some varieties of French more than others.

With respect to the preference for prototypical marking, Andersen (2002) has hypothesized that grammatical aspects are distributed with a higher frequency among certain verb types in the L2 input. The resulting skewed distribution favours prototypical over non-prototypical marking, leading learners to create false mental representations of the L2 tense-aspect system. Harley and Swain (1978) and Harley (1986) also point out that the emergence of *être* and *avoir* as the early verbs in the imperfective, followed by *vouloir*, *aimer*, and *pouvoir*, could relate to L2 input frequency, as these forms are common in classroom discourse.

Collins (2005) notes that detailed analyses of tense-aspect markers in classroom input are needed to determine whether the hypothesized distributional bias of prototypical uses of temporal morphology in native speaker use exists. Studies that have included L2 learners' perceptions of the factors influencing their choices of tense-aspect markers provide indirect evidence in support of a distributional bias. Learners of English (Collins, 2005), French (Izquierdo & Collins, in press), and Spanish (Liskin-Gasparro, 2000) report noticing tense-aspect patterns in the L2 input/instruction which are consistent with their own use of these forms.

3.4.3. Cognitive Challenges

Andersen (2002) indicates that the uneven distribution of tense-aspect markers in learners' outcomes may also be in part the result of learners' cognitive predisposition to prefer prototypical marking. To express grammatical aspect, learners need to differentiate temporality expressed through the various functions of tense-aspect markers

from that inherent in the meaning of verbs. This generates a cognitive workload that decreases when the semantics of verbs align (i.e., prototypical marking), but increases when learners need to contradict temporality inherent in the meaning of verbs (i.e., non-prototypical marking).

3.4.4. L1 Influence

In all of the research previously reviewed, the participants were English-speaking (i.e., Anglophone) learners of French. Unlike French, English does not grammaticize the distinction between perfective and imperfective aspects. Most of the functional values of the French imperfective, along with that of the French perfective, can be rendered in English by the *simple past*. To differentiate between a single instance or multiple occurrences of the action of *planting strawberries* in the sentence *during the summer, I planted strawberries*, knowledge of the context, adverbials, or the use of the optional habitual aspect markers *used to* or *would* are needed. In French, this difference is clearly established with temporal morphology as illustrated in Section 3.1.

The progressive value of the French imperfective is rendered in English by the *past progressive*, but there are times when even this function can be expressed through the *simple past* as well. For example, *I hit my head as I fell down the stairs* versus *I hit my head as I was falling down the stairs* can both express a progressive meaning (for further discussion, see Ayoun, 2005; Clemance, 2004).

Similarity between the English past progressive and the progressive value of the French imperfective appears to mislead learners to restrict the use of the French imperfective to its progressive use at the expense of its other values (Ayoun, 2004, 2005; Harley, 1992). This association could explain, in part, the low spread of the imperfective.

Harley (1992) indicates that English prohibits progressive-stative associations. Thus, it can be hypothesized that in early stages, Anglophone learners may be reluctant to supply the progressive with statives, as the generation of sentences such as *j'appartenais à un parti politique* would translate as **I was belonging to a political party*, which would sound odd in English. Harley adds that the use of the progressive with dynamic verbs is more restrictive in comparison to that of the *simple past* in English, and this L1 use of the progressive may be monitoring the use of the imperfective in French, constraining the use of the imperfective with dynamic verbs.

L1 influence has been observed to affect the acquisition of temporal morphology. Collins (2002) showed that among French learners of English, present perfect (a compound construction similar in form but not in function to the *French passé composé*) competed with the simple past with telic verbs, which was not observed among learners of mixed-L1 backgrounds, virtually all of whom spoke languages in which the compound form does not exist (Bardovi-Harlig & Reynolds, 1995). This finding was corroborated in a cross-sectional comparison of Japanese and French-speaking learners' use of simple past, in which Francophones' inappropriate use of present perfect in obligatory contexts for the past resulted in a significant difference between the two L1 groups with the telic achievements (Collins, 2004).

In a longitudinal study of the development of tense-aspect marking of a Dutch learner of English, Housen (2000) concluded that L1-L2 differences may increase learners' reliance on the temporality inherent in the meaning of verbs. Dutch learners need to acquire the distinction between the *simple past* and the *past progressive* which is not marked in their L1. Housen found that his participant's use of *past progressive* and

the *simple past* with regular verbs were in line with the inherent temporality of verbs, but the simple past with regular verbs was not. Housen argued that this was the result of the learner's reliance on the temporality in the meaning of verbs in cases where she functioned on a rule-based system for tense-aspect marking, but not when she needed to operate with irregular verbs that the participant had already acquired.

Among Anglophones, the acquisition of the perfective and imperfective difference is a major challenge resulting from an intricate interdependence of variables, including L1-L2 differences. Some researchers have hypothesized that L1 influence can make the acquisition of temporal morphology '*easy*' for learners who already mark imperfective in their L1 (De Lorenzo Roselló, 2001; Kihlstedt, 2002). This is probably because learners already override lexical aspect in their L1; they already differentiate perfective from imperfective functions; they may face less cognitive load to retrieve the functions of grammatical aspect markers in the L2; and finally, they may be less reliant on the L2 input to understand how the L2 temporal system works.

Yet, there is qualitative and quantitative evidence that Spanish-speaking (i.e., Hispanophone) learners who mark the perfective and imperfective distinction in their L1 proceed through the acquisition of past tense marking in French L2, operating on associations between verb semantics and the functional values of perfective and imperfective markers. Izquierdo and Collins (in press) examined the extent to which L1-L2 similarities appear to facilitate the overall and appropriate use of tense-aspect markers with verb types among learners of French. Anglophone and Hispanophone participants at low-intermediate levels of French proficiency completed a cloze task with equal numbers of obligatory contexts for the use of the French perfective and imperfective and a 20-

minute retrospective interview explaining their use of past tense markers in the task. Results revealed that marking the perfective/imperfective distinction in the L1 benefited the use of imperfective with statives and telic verbs among Hispanophones, decreasing reliance on verb semantics, pedagogical rules and adverbials. Yet, L1 influence did not override the challenge of using imperfective in non-prototypical contexts.

Since Izquierdo and Collins' (in press) observations of the L1 benefit on L2 tense-aspect marking were limited to one level of L2 proficiency, a follow-up study was developed during the organization of the current doctoral dissertation (Izquierdo, 2006, in progress) to investigate whether L1-L2 similarities would help learners override lexical aspect influence with the increase of L2 past tense proficiency. The overall and appropriate uses of French past tense of 44 Hispanophone participants from four French tense-aspect proficiency levels were documented through a cloze task with 23 perfective and 23 imperfective contexts distributed across four verb types. Similar to findings reported by Izquierdo and Collins (in press), results from analyses of variance of the 2254 tokens generated by the participants revealed a benefit for imperfective development, overriding the overall perfective over imperfective preference documented among Anglophones. Yet, the perfective and imperfective choice remained dependent on verb types, indicating a challenge for the use of perfective and imperfective in the most non-prototypical contexts; that is, in the use of perfective with atelic verbs, and imperfective with telic verbs.

Evidence from these studies with Hispanophone learners of French² show that L1-L2 similarities benefit the rate of imperfective marking. But, lexical aspect acts upon learners' past tense marking choice, leading even highly proficient Hispanophone learners of French to prefer prototypical marking in contexts where both the L1 and L2 would require non-prototypical past. Based on these results, Izquierdo and Collins (in press) concluded that non-prototypical marking constitutes a universal challenge among learners of French and that form-focussed pedagogy and research are needed to provide learners with sustained opportunities to override lexical aspect through the use of tense-aspect markers.

3.4.5. Instructional Challenges

The small number of experimental studies looking at the impact of instruction on the development of tense-aspect marking in French L2 have provided limited evidence of the benefits of instruction on the use of perfective and imperfective marking. In French immersion classes in Canada, Harley (1989) investigated the effects of a treatment that provided grade-six learners with rich input and output opportunities to gain control over the functional values of the perfective and imperfective. The experimental group received the treatment over a period of eight weeks. The control group was not exposed to the treatment and continued with their regular classes instead. Significant differences in immediate post-test results favoured the experimental group in two of the three testing tasks, but these differences disappeared during a delayed post-test three months later;

² The contexts of these studies were also the context where the study of this dissertation was conducted. Participants were not the same, but the learning conditions and profiles were identical. Prior to the implementation of the multimedia experiment, participants in this doctoral study were assumed to exhibit the same past tense acquisition challenges and pedagogical needs. This assumption was confirmed during their past tense assessment, as Chapter 5 illustrates.

analyses of learners' responses revealed no differences between the experimental and control groups, due to gains in the use of perfective and imperfective among the control groups.

Harley (1989) reported that some of the teachers in the control group had drawn learners' attention to the use of the perfective and imperfective in their classes. Although this attention was not as focussed and sustained as the experiment, it may have influenced the results. In the experimental groups, the treatment increased learners' communicative opportunities for past tense marking, but some teachers and learners seemed to have disregarded attention to the linguistic elements of the past tense during these opportunities.

Similarly, in the discussion of the limited benefit of her instructional treatment, Ayoun (2001, 2004) also pointed out that the little attention that learners' reported having paid to the use of the past tense during completion of the five-week computer-based treatment might have mediated instructional gains. Ayoun's (2001) participants were exposed to a computer-based treatment in which, according to learners' reports, features in the environment had entertained their attention during the completion of the tasks, preventing them from identifying the linguistic focus of the meaning-oriented activities.

Lyster (2004) argues that the treatment implemented by Harley (1989) "may have overemphasized production activities at the expense of more activities promoting noticing and language awareness" (p. 334), hence, learners had insufficient opportunities to integrate target-like forms into their emerging grammars, and make interlanguage changes; the same can be argued for Ayoun's (2001, 2004) results. In other words, absence of procedures that push learners to attend to the target linguistic features in these

experiments prevented learners from noticing differences between their interlanguage and the L2 and to appropriately use past tense markers in communication.

Findings from Harley (1989) and Ayoun (2001, 2004), then, point out that rich meaning-oriented exposure to past tense marking is not sufficient to facilitate past tense learning. Learners also need pedagogical assistance through activities that, in addition to rich practice and feedback, as indicated by Lyster (2004, p. 335), promote noticing and language awareness, as these activities can help learners notice aspects of the L2 tense-aspect system that they need to acquire.

Harley (1989) and Ayoun (2001, 2004) also acknowledged that the results of their treatments might have been impacted by the manner in which past tense markers appear in the L2 input, which, according to Andersen (2002), favours a prototypical distribution. But, their pedagogical intervention had not been designed to investigate the effects of input quality on past tense development. In this respect, Abrate (1983) also pointed out that instructional materials are limited in the quality of past tense marking that learners are exposed to, as explanations and exercises on the use of tense-aspect markers in books seem to be in line with their natural use in the L2. This type of instruction, in turn, can be hypothesized to provide learners with increased exposure to the aspects of the past tense that they already mark, but not for non-prototypical contexts where the challenge for the acquisition of perfective and imperfective markers exists.

Moreover, Ayoun (2004) points out two more limitations in past tense instruction. First, with respect to the functional values of past tense markers that meaning-oriented tasks can elicit, instruction can fall short of providing learners with sustained exposure to contrast and differentiate the functional values of past tense markers. Contexts for

narratives such as *My Best Birthday Party* may elicit perfective to mark completeness and imperfective to indicate duration, but the topic may fail to elicit the habitual or progressive values of the imperfective.

Second, Ayoun (2004) indicates that in the natural use of the language, perfective and imperfective markers can appear jointly with adverbials that could also realize the function of these tense-aspect markers (see also Abrate, 1983; Harley & Swain, 1978). In a sentence such as: *Je m'assoys toujours à côté du sapin* "I always sit-imperfective next to the Christmas tree", both the adverbial (i.e., *toujours* "always") and imperfective morphology render the notion of habituality. This enables learners to understand habituality through the adverbial without focussing on imperfective morphology, thus, decreasing opportunities for learners to notice the use of non-prototypical marking in the sentence (i.e., *s'asseoir*, to sit, in imperfective).

Blyth (2005) and Howard (2002) advocate the use of pedagogical materials that push learners to tease apart lexical aspect from tense-aspect values, and thus, help learners experience non-prototypical marking from input and output. The use of these past tense forms can be facilitated through L2 input-based tasks (e.g., Batstone, 1994; Loschky & Bley-Vroman, 1993) creating conditions for and intake of non-prototypical past. As Batstone (1994) indicates, noticing may not suffice for interlanguage restructuring, however; especially, as Lyster (2004b) argues, when interlanguage forms seem to have become recalcitrant.

Learners, then, need sustained L2 practice opportunities in which they can be pushed to build L2 form-meaning connections, so that target-like forms can be integrated into the emerging L2 systems promoting interlanguage changes (i.e., structuring/

restructuring as indicated by Batstone 1994). According to Ranta and Lyster (2007), this integration is not an easy process, because the use of target-like forms may compete with reliance on ill-formed language, which is already accessible to learners.

The creation of meaning-oriented output tasks that promote the use of specific target language forms, especially those that are of low occurrence in the L2 is a very complex and challenging matter (Batstone, 1994; Loschky & Bley-Vroman, 1993), because learners can circumvent target forms during output tasks through use of stabilised interlanguage forms (R. Ellis, 2003; Lyster, 2004b; Skehan, 1998). In addition, in classrooms where the same L1/interlanguage system is shared, learners can effectively achieve communication with peers using ill-formed language (Spada, Lightbown & White, 2005). As a result, tasks whereby learners can bypass attention to non-prototypical past limit the potential of the generation of output to help learners restructure their emerging L2 past tense system. The following section introduces the manner in which multimedia environments can help learners overcome limitations in the learning of the past tense.

3.5 Investigating the Effects of Multimedia on Past Tense Development

This chapter has shown that a universal challenge for learners of French is the meaning-oriented use of past tense markers in non-prototypical contexts and that learners then need instruction that systematically focuses their attention on this past tense type. However, classroom instruction seems limited in two aspects:

- (a) Non-prototypical past appears to be scarce in input and output opportunities available to learners, due to the way in which past tense markers function and interact with verbs in the L2.

- (b) In cases where such opportunities may occur, absence of attention to the linguistic form (i.e., non-prototypical past) and their prototypical preference prevent learners from noticing, taking in and retrieving the type of past tense that they need to develop.

L2 learning is limited in the amount of exposure that learners have to rich and natural contexts that can facilitate L2 acquisition, but computerized environments offer an alternative to overcome this limitation and provide learners with the type of input that could benefit the learning of an L2 (Cobb, 1997, 2005; Cobb & Stevens, 1996; Gaskell & Cobb, 2004).

Drawing on theoretical and empirical evidence in Chapter 2, three assumptions are made with respect to the use of multimedia to facilitate non-prototypical past tense instruction that could lead to changes in the use of perfective and imperfective among instructed learners of French in the foreign language classroom.

First, in multimedia environments the occurrence of non-prototypical past can be controlled in order to multiply its use in L2 learning tasks. Unlike in classroom instruction, Chapelle (2001) and Hulstijn (1997) indicate that, in computer applications, the quality and type of L2 input that learners need to process can be manipulated. This property of multimedia learning environments requires that the verbal information that learners are to process for either comprehension or production be predetermined to increase the frequency of non-prototypical marking across tasks, and that the non-prototypical use of perfective and imperfective be arranged, to ensure reoccurrence across verb types.

Second, the multi-modality stimuli nature of multimedia learning environments makes it feasible to deliver this treated language through ‘authentic’ meaning-oriented contexts constructed through narratives that integrate video files and aural and written language. This integrative use of media provides learners with exposure to non-prototypical past tense through the combined use of verbal (e.g., written/aural narratives) and non-verbal input (e.g., video stories).

Third, in these meaning-oriented contexts, form-focussed mechanisms can be built into the multimedia tasks in order to push learners to attend to the form-meaning connections that underpin the use of non-prototypical past. In other words, while meaning is the primary focus of learners' production or comprehension in multimedia tasks, different multimedia features and pedagogical procedures (e.g., feedback, input-processing instruction) can systematically drive learners' attention to the form-meaning connections that underpin the use of past tense markers in the environment.

During input-based tasks, for instance, the combination of increased frequency in the use of the target form in written, aural, and visual contexts and enhancement provided through typographical features in written texts can make the target forms perceptually salient, so that learners can notice them from input. Further, the integration of input processing procedures in the multiple reoccurrence of non-prototypical forms in multimedia instruction multiplies learners' opportunities to discover non-prototypical form-meaning connections, as learners engage in the extraction of meaning from form several times.

The use of multimedia to provide form-focussed opportunities that help learners gain control over the use of L2 grammatical forms in meaning-oriented production has

received little attention in current research (Chappelle, 2001; Skehan, 2003; Plass & Jones, 2005). Yet, drawing on the results presented in Chapter 2, multimedia can also offer a potential for non-prototypical past tense development through production tasks. For instance, the computer environment can prime learners to generate the target forms, and the implementation of feedback on the appropriate use of non-prototypical past tense can help learners, not only to integrate these forms in their immediate output, but also to modify their interlanguage systems promoting past tense development. Details on the manipulation of the target forms, the creation of multimedia meaning oriented contexts, and form-focussed procedures will be provided in the following chapter.

Clearly, questions rise with respect to the effects of this type of form-focussed multimedia instruction on learners' attention to the target forms in the input and output, on their motivation in the lesson content and tasks, on the manner in which all these opportunities can result in more target-like use of the past tense, and on the manner in which different multimedia-based lessons can benefit past tense learning. In this study, the effects of multimedia instruction on the target-like use of the past tense will be examined. During the discussion of the findings, however, aspects in the implementation of the multimedia treatment that may have contributed to past tense changes will be addressed (e.g., learners' attention to the target forms across different multimedia lessons). The research questions and hypotheses formulated in this study are presented below.

3.5.1 Research Questions and Hypotheses

Operating on the assumptions previously presented, two research questions were formulated with respect to the effects of multimedia instruction on the acquisition of L2 grammar. The first question relates to the manipulation of the areas of past tense marking in multimedia instruction and the impact of such manipulation on the appropriate use of L2 tense-aspect markers.

Research Question 1

Q1: Is form-focussed multimedia instruction on non-prototypical past more effective at facilitating past tense improvement than form-focussed multimedia instruction on prototypical past?

Lightbown (1998) has pointed out the importance of investigating the manner in which learners may respond to form-focussed instruction at different stages of L2 grammar acquisition, as this type of investigations can shed light on instructional efficiency (i.e., timing). Therefore, a second question was formulated with respect to the effects of multimedia instruction on past tense improvement.

Research Question 2

Q2: Does the past tense developmental condition of L2 learners mediate the effects of multimedia instruction on past tense improvement?

In order to address these two research questions, five hypotheses were formulated drawing on empirical and theoretical evidence reviewed in the current chapter.

Evidence presented in this chapter suggests that predominance of prototypical marking in the L2 input may mislead learners to operate on a prototypical preference in the L2 and that the manner in which past tense marking function in the L2 may not lead to exposure to difficult areas of past tense in instructional materials available to learners.

The chapter highlighted that instruction that provides learners with exposure to non-prototypical marking may assist the development of this area of past tense, however, because it can push learners to differentiate the inherent semantic properties of verbs from the functional values of past tense markers; it may, in turn, lead learners to appropriately mark grammatical aspect regardless of the inherent temporality of verbs. Hence, Hypothesis 1 was made with respect to Research Question 1.

Hypothesis 1

H1: Form-focussed multimedia instruction on non-prototypical past tense will lead to more target-like use of past tense than form-focussed multimedia instruction on prototypical past.

Congruent with the Aspect Hypothesis (Andersen, 2002; Andersen & Shirai, 1994), evidence presented in this chapter from various instructional contexts with young and young-adult learners of French showed that perfective and imperfective emerge in prototypical contexts and then, slowly, spread through non-prototypical contexts. Results from Ayoun's (2001, 2004) experimental intervention showed that, among her participants, instruction benefited changes in perfective but not in imperfective and that changes in perfective occurred mostly in prototypical contexts.

Drawing, then, on the Aspect Hypothesis and evidence of documented developmental patterns of past tense (e.g., Bardovi-Harlig & Bergström, 1996; Harley, 1992; Salaberry, 1998), development of non-prototypical past involves development of prototypical marking, but development of prototypical past does not appear to involve changes in non-prototypical use. Thus, the following four hypotheses were formulated

with respect to Research Question 2, in reference to the impact of the two different types of multimedia instruction (i.e., prototypical and non-prototypical) on the developmental groups' (i.e., NR and RD for non-prototypical past) use of past tense markers.

Hypothesis 2

H2: Form-focussed multimedia instruction on non-prototypical past tense among learners who are not ready for non-prototypical past will promote an increase in target-like use of prototypical and non-prototypical past.

Hypothesis 3

H3: Form-focussed multimedia instruction on non-prototypical past tense among learners who are ready for non-prototypical past will promote an increase in target-like use of non-prototypical marking.

Hypothesis 4

H4: Form-focussed multimedia instruction on prototypical past among learners who are not ready for non-prototypical past will promote an increase in target-like use of prototypical past only.

Hypothesis 5

H5: Form-focussed multimedia instruction on prototypical past among learners who are ready for non-prototypical past will not promote an increase in target-like use of prototypical or non-prototypical past.

The next chapter describes the methodology used to address the research questions and hypotheses.

3.6 Chapter Summary

This chapter shows that learners seem to operate on the use of the perfective and imperfective as complementary past tenses, due to a preference for prototypical marking (i.e., perfective-telic verbs, imperfective-atelic verbs). The use of perfective and imperfective in contexts where their functional values do not align with the inherent temporality of verbs, therefore, constitutes a developmental challenge. The nature of the L2 and instructional limitations appear to further compound full development of the past tense system among instructed learners of French. Research is needed on the effects of instruction that systematically focuses learners' attention on non-prototypical past during meaning-oriented comprehension and production tasks.

Drawing on the documented and hypothesized benefits of multimedia instruction presented in Chapter 2, Chapter 3 raised the question whether rich form-focussed multimedia instruction on the non-prototypical use of perfective and imperfective could be more effective at promoting the acquisition of this area of the French past tense than form-focussed multimedia instruction on the prototypical past and whether the effectiveness of form-focussed multimedia instruction could be mediated by learners' readiness to process non-prototypical past. Chapter 4 presents the methodology through which these questions were addressed in this dissertation.

CHAPTER 4

METHOD

This chapter presents the procedures used to identify the effects of multimedia instruction on the development of past tense marking among classroom learners of French in the foreign language context. Sections 4.1 and 4.2 describe the research context and the participants of the study respectively; Section 4.3 presents the design of the study; Section 4.4 focuses on the instructional multimedia environments, describing the form-focussed procedures, lexical complexity, lessons and experimental past tense instruction types. Section 4.5 presents the assignment of the participants to their corresponding experimental multimedia learning conditions. Section 4.6 describes the instruments that were used to examine (a) the impact of the multimedia treatment on learners' past tense changes and (b) learners' attention to the treatment and teachers' attention to past tense during regular classroom practices. Finally, Section 4.7 presents the timeline of the study and describes its implementation in the classroom.

4.1 Research Context

The study was conducted in the French as a Foreign Language context at the university level in Mexico from the last week of August through the first week of November 2006. The participating university was interested in exploring the potential integration of educational software and other computer tools into the teaching practices of its academic departments, to provide learners with rich and stimulating learning activities. Within this context, the multimedia environments were well received and integrated into the regular classroom teaching materials of the seven participating classes as part of an

innovative program of the Language Centre to support the teaching of French with technology.

French is one of the seven foreign language programs that constitute the continuing education offerings of the university's Language Centre. The program is divided into six levels: French I, II, III, IV, V and VI. Each level includes 60 hours of classroom instruction and ten hours for formal testing. These hours are distributed over 12 teaching weeks and two testing weeks. Formal testing includes written and oral assessment of learners and occurs in the middle and at the end of the term. In order to continue to the next French level, learners need a final average of 70 out of 100. Classes are held daily from Monday through Friday and are one hour long. Upon completion of the French program, learners are granted neither credits nor a degree from the French courses. However, throughout the French levels, learners receive preparation to take an international examination administered by the Ministry of Education of the French Republic called: *Diplôme d'Études en Langue Française* (DELF).

4.1.1 Participating Classes

Seven intact classes with a total of 73 learners from French levels III, IV, V, and VI, which represent the second and third years of the French program, participated in the study. Participants were returning from a two-month summer break when the study commenced during the last week of August. Learners in French III had completed about 120 hours of classroom instruction and learners in French VI had had about 300 hours.

Teachers implemented all the treatment materials and the tests with their 73 learners during in-class time as part of their regular classroom materials and activities.

Due to data attrition, however, the reports presented in this study included data from 54 learners only. Table 4.1 illustrates that 23 participants were enrolled in the three sections of French level III FR301 ($n = 10$), FR302 ($n = 9$), and FR303 ($n = 4$). There were 13 learners enrolled in the French IV sections, FR401 ($n = 11$) and FR402 ($n = 2$). Participants in the highest French levels were enrolled in FR501 ($n = 15$) and FR506 ($n = 3$). There were more female (69%) than male participants (31%) in the classes; further details on the participants will be presented shortly.

Table 4.1

Distribution of Learners Across Participating Classes

Gender	FR301	FR302	FR303	FR401	FR402	FR501	FR506	Total
Male	3	2	3	4	0	5	0	17
Female	7	7	1	7	2	10	3	34
Total	10	9	4	11	2	15	3	54

4.1.2 Participating Teachers

Five teachers taught the participating classes. One teacher taught three classes. The other teachers taught one class each. Teachers were fluently trilingual speakers of French, English and Spanish. They were native speakers of Spanish who had learnt their foreign languages at the participating Language Centre and had also graduated from the B.A in Language Studies of the university. All teachers had received language teacher training and had a minimum of two years of French teaching experience with young-adult university learners. Three teachers held the DELF, two of whom had participated in a

teacher exchange program organized by the French embassy in Mexico and had lived and taught in the South of France for six months.

All teachers had become acquainted with the nature of the experimental project through their participation in two classroom-observational studies conducted by the researcher during 2004 and 2005 as part of the needs analysis stage of the current research (Izquierdo, 2006; Izquierdo & Collins, in press). Only after completion of the experiment did teachers inform learners that the multimedia environments focussed on the teaching and learning of the past tense.

With respect to the target L2 grammar in the study, teachers agreed not to intentionally focus on the use of perfective and imperfective markers during the implementation of the research project unless otherwise prompted by students and when inappropriate use of the target forms hindered communication; absence of past tense focus during classroom time was confirmed through classroom observations and teacher reports which will be described later in this chapter.

4.1.3 Classroom Instruction

The use of Spanish is discouraged in the French program. Spanish is briefly used in French level I to deliver instructions. In higher levels, French is the language of instruction. No comparisons are made with the learners' L1. Teachers normally scaffold learner-teacher communication and learners' communication with peers during classes.

Instruction includes overt grammatical explanations and meaning-oriented tasks, facilitated through the use of a textbook and complementary teaching materials such as photocopies, video and audio CD recordings. Overt grammatical explanations include grammar rule explanations and exercises. Meaning-oriented tasks include a variety of

speaking activities in the form of teacher-class discussion, and peer and group work. While most of the class time is devoted to speaking activities, teachers also implement reading activities, which are followed by classroom discussion and peer work. There is little emphasis on writing, unless it is required as part of the DELF preparation.

The degree of implementation of all these activities varies from teacher to teacher. Some teachers lean towards more meaning-oriented tasks, while some others focus more on grammar rules. Some teachers favour teacher-class discussion over peer- or group work. Since learners attend all these classes as optional courses, they are generally enthusiastic about their classes and the instructional tasks. They specially like activities that involve listening, video and the Internet.

4.1.4 Previous Past Tense Instruction

Perfective (*passé composé*) and imperfective (*imparfait*) had been taught in the last unit of French level II. In this level, past tense is normally covered during the last eight hours of the term, once learners have sufficient vocabulary to undertake the practice of these forms in comprehension and production tasks. Past tense focus includes explicit teaching of the functional values of the perfective and imperfective, practice on morphology and syntax, and use of past tense for comprehension and production.

Teachers in the French program have come to realize through experience that the learning of the perfective/imperfective distinction constitutes a challenge in the target population. Thus, the syllabus of each French level includes ten hours for practice and informal assessment of the *passé composé* and *imparfait*. The time allotted to these grammar forms is distributed throughout the term. Participating teachers agreed to cover the past tense hours during the first ten weeks that preceded the official midterm through

the implementation of the experimental multimedia lessons and tests as part of the regular teaching and formative testing practices, rather than through their regular class materials³.

4.2 Participants

All 54 participants reported on in this study were attending their French classes on a regular basis and agreed that their data be used for the current study through a consent form which they signed prior to the study implementation (the ethics and consent forms are presented in Appendix B1). Out of 54, 53 participants were native speakers of Mexican Spanish. One participant was a visiting undergraduate student from Germany who was doing Spanish immersion in the region. The average age was 23, and almost all participants (89%) were within the 19-26 years-old range. Most participants (85%) were undergraduate students at the participating university and the other were professionals working in different fields (for further details on participants' demographics obtained through a linguistic background questionnaire, see Appendix C).

With respect to previous foreign language learning experience, three participants reported French as their first foreign language; 36 reported French as their second foreign language, and 15 indicated that French was their third foreign language. A total of 21 learners were learning French and English; 29 reported learning French, English and an additional language (i.e., German, Italian, Portuguese or Japanese). Two learners

³ Teachers and students agreed that, in order not to bias the results of the study, results from all experimental tests would be provided at the end of the experiment. Learners were not formally assessed on the target forms during the midterm test that followed the experiment. Rather, these forms were covered in the official tests administered at the end of the school term, so that learners would have time to verify their test results.

reported knowing German or French only; one reported knowledge of German and Portuguese and one did not provide information on foreign language learning.

With regards to French learning, five participants reported having lived either in Canada or France. Four of them had spent less than six months in these countries. About 47% of the participants reported between one and two years of previous French instruction; 40% reported between two and three years; and 13% reported more than three years learning French. Places where participants had attended previous French classes included the B.A. in Language Studies at the participating university, other universities, private language schools, or the *Alliance Française*. At the time of the study, about 57% of the learners indicated that they were currently learning French in the participating classes only; 33% reported learning French in the B.A. in Language Studies⁴, and the rest of the participants were attending classes somewhere else.

In reference to their current French study habits, 57% of the learners reported one or two study hours out of the classroom time; 4% of the learners reported between three and four hours of French study, and about 39% reported more than five study hours. In order of importance, participants indicated that these hours of independent French study were invested in completion of classroom assignments, Internet surfing, film/music-video watching, music listening, magazine reading, study/conversation clubs, and writing.

⁴ French classes in the B.A. in Language Studies focus on content only through courses related to French-speaking civilizations and literature. Due to absence of focus on form/s in these French courses, learners in the B.A. in Language Studies enrol in the French program of the Language Centre where they focus on the learning of French.

4.3 Design

This was a three-factor quasi-experimental classroom-based study. The interaction of three independent variables, namely past tense developmental condition, multimedia instruction and testing time were observed on the dependent variable appropriate past tense use. Three different past tense areas were examined: (a) overall appropriate use, (b) appropriate use of perfective and imperfective, and (c) appropriate past tense use in prototypical and non-prototypical contexts.

Within each participating class, learners were classified into one of two developmental conditions (i.e., ready or non-ready for non-prototypical past). Then, learners from each developmental condition were assigned to one of two form-focussed multimedia instruction types: prototypical (Environment E1) or non-prototypical past (Environment E2). Samples of past tense use were collected from all participants one week prior to the first treatment lesson (pre-test), the day immediately after the administration of the last treatment lesson (immediate post-test) and three weeks after the last treatment lesson (delayed post-test). The following sections describe the operationalization of the form-focussed experimental multimedia environments, the developmental conditions and the experimental multimedia learning conditions.

4.4 Experimental Multimedia Environments

To investigate the research questions and hypotheses of the study, two multimedia L2 learning environments were developed (Izquierdo & Lyster, 2007). Each environment included four one-hour lessons that were constructed respecting the curricula of the participating university French program. The meaning-oriented use of

past tense was facilitated through the integration of different multimedia features in reading, listening, video watching and writing tasks. Tasks were identical between environments. The environments were also identical in form-focussed procedures, task sequence, and number and types of verbal predicates. The environments differed only in terms of the type of past tense used with the verbal predicates, namely prototypical or non-prototypical.

The following sections describe the form-focussed principles that were used to design the environments. Then, a description of the four lessons included in the environment is provided. At the end of the section, the operationalization of the prototypical and non-prototypical instruction types is presented.

4.4.1 Form-focussed Instruction

Form-focussed instruction refers to “any planned or incidental instructional activity that is intended to induce language learners to pay attention to linguistic form” (Ellis, 2001, pp. 1-2). Drawing on this definition, all four multimedia lessons in the learning environment were designed around meaning-oriented comprehension or production tasks, in which learners were repeatedly exposed to past tense in various multimedia contexts. Depending on the comprehension or production nature of the multimedia contexts different procedures were used, to draw learners' attention to past tense. The following sections synthesize these procedures.

4.4.1.1 L2 Input

Three aspects of the comprehension tasks aimed at helping learners attend to past tense in the L2 multimedia input: frequency of the L2 forms, input enhancement and

input-processing instruction. It should be noted that the frequency and input-processing aspects were also present in the output tasks.

4.4.1.1.1 Frequency. According to Sharwood Smith (1993), one way to attract learners' attention to L2 forms in the input available to them is by increasing their frequency of appearance. The distribution of 212 predicates in past tense contexts across the lessons made possible that learners encountered past tense forms in every sentence that they needed to process during the multimedia-based comprehension or production tasks (the procedures for the selection of the verbal predicates will be presented shortly). This resulted in very frequent occurrences of the past tense in either prototypical or non-prototypical contexts. Results from multimedia research have revealed that, in addition to frequency, other procedures are needed to help learners attend to target aspects of the L2 input, hence visual enhancement and input-processing mechanisms were also included in the environment.

4.4.1.1.2 Visual enhancement. Sharwood Smith (1993) also indicates that forms present in L2 input can be made perceivable to learners through graphic saliency. Doughty (1991) and Brett (1998) showed that this can be effectively done in computerized environments by changing the size or colour of fonts, or by bolding or underlining the forms. However, in a classroom-based study looking at the acquisition of possessive determiners in English (*his* vs. *her*) through input enhancement, White (1998) found that visual enhancement alone did not produce significant changes in the interlanguage of young learners of English in comparison to those conditions where input enhancement was not provided. White (1998) explained that input enhancement makes forms typographically salient, but does not push learners to gain knowledge of the form-

meaning connection of the enhanced forms, and consequently, input enhancement should be provided in a way that enables learners to gain knowledge about the target forms; in the case of possessive determiners, she suggests the use of different colours to distinguish *his* from *her*. Following this advice, in this study, perfective and imperfective were highlighted using different font colours: blue for perfective, green for imperfective.

4.4.1.1.3 Input processing instruction. Chapter 3 showed that due to the natural redundancy of the language, learners may extract the perfective or imperfective values from temporal adverbials without attending to past tense marking (Ayoun, 2004). VanPatten (e.g., VanPatten, 2004) and his colleagues argue that exposure to this type of L2 input does not benefit interlanguage changes, because learners do not focus their attention on the linguistic features that encode meaning, (Sanz, 2004; Sanz & Morgan-Short, 2004; VanPatten & Cadierno, 1993a; VanPatten & Wong, 2004; Wong, 2004a).

Temporal adverbials were then removed from sentences in contexts where they were redundant with the meaning of tense-aspect markers. This made learners dependent on perfective or imperfective markers to understand the manner in which the actions were being portrayed. During the video-based comprehension task, for instance, learners were required to read a sentence such as *La Panthère sortait le fauteuil, le fauteuil revenait et cognait à la porte* “The Panther take-IMP the armchair out, the armchair come-IMP back, and knock-IMP at the door” and then, based on the events taking place in the video, they had to identify the sentence as true or false.

4.4.1.2 L2 Output

Swain and Lapkin (1995) hypothesize that providing learners with feedback on their use of the L2 during output tasks is beneficial, as these indications help learners

realize differences between their interlanguage and the L2. Chapelle (1998, 2001) points out that during learner-computer interaction, computers can act as more proficient L2 users and provide learners with feedback on interlanguage forms that need restructuring. Bangs (2003) adds that in computer applications “Feedback can be the feature which enables independent learning. It can also be the key to individualized learning if handled well” (p. 82). However, as Chapelle (2001) indicates, the manner in which feedback can be provided and the L2 learning effects of this feedback provision during meaning-oriented output tasks have received little attention in CALL research (pp. 73-74), and in this particular case, in L2 multimedia learning environments.

Different types of feedback were integrated in all the lessons, to increase the possibilities for learners to attend to the use of past tense in prototypical and non-prototypical contexts. In general, these feedback types were classified as *feedback on form* or *feedback on meaning*, as the two following sections illustrate. Feedback types were consistent between the environments, but they varied within the environments, across lessons, in order to fit the nature of the multimedia tasks.

4.4.1.2.1 Feedback on form. In instructed SLA research, Lyster (Lyster, 2001, 2007; Lyster & Ranta, 1997) has argued that, there is a need to differentiate between form-focussed feedback that scaffolds interaction during output tasks, from feedback that draws attention to ill-formed language. He indicates that feedback that draws attention to ill-formed language (i.e., negotiation of form) may be more effective than feedback that serves to scaffold communicative interaction (i.e., negotiation of meaning), because negotiation of form pushes learners (a) to attend to the aspects of their interlanguage that they need to modify, (b) to draw on their knowledge of the L2 to accomplish such

modification, and (c) to integrate appropriate use of the L2 forms in their output (i.e., repair). This, in turn, can lead to interlanguage restructuring. In addition, recent studies comparing different feedback types point to differential effects with respect to feedback that facilitates negotiation of form from feedback which does not (for further discussion, see Ammar & Spada, 2006; Ellis, Loewen & Erlam, 2006; Lyster, 1998, 2004a, 2007).

Multimedia-facilitated feedback enabled through the environment was, hence, divided into: Feedback on Form and Feedback on Meaning. *Feedback on Form* overtly drew learners' attention to the use of past tense through metalinguistic prompts, computer-facilitated self-correction, and peer-correction during meaning oriented tasks.

Metalinguistic prompts Drawing on the work of Lyster and his colleagues (Lyster, 2004a; Lyster & Mori, 2006; Lyster & Ranta, 1997; Panova & Lyster, 2002), in Lesson 1, feedback on form was delivered in the form of questions that contained metalinguistic clues about past tense and verbs (these clues did not use linguistic jargon, as the examples below show). These questions asked learners to look back at the sentences they had produced/been exposed to and to attend to the actions being narrated and the manner in which those actions were being presented. Some of these questions were:

Comment est-ce que l'action dans la dernière phrase du paragraphe se passe?

“How is the action in the last sentence of the paragraph taking place?”

De quelle manière se passent-elles, les actions, dans les trois phrases que nous vous donnons?

“How are the actions in the three sentences that you were presented with taking place?”

Computer-facilitated self-correction According to Swain (1998), learners can be pushed to modify their output through activities that provide them with opportunities to think about their use of the L2 and make and test hypotheses as to how the L2 works. Based on this argument, one feedback mechanism provided by the environment in Lessons 2 and 4 consisted of giving learners the opportunity to compare their own L2 production to a multimediated text. This process of comparison provided learners with an opportunity to analyse, at a word-by-word level, what they had produced. This served two purposes: looking at the multimediated text provided by the computer exposes learners to a more complex and richer use of the target forms and also allowed them to notice differences between their interlanguage and the L2.

Peer-correction Various researchers have indicated that providing learners with collaborative meaning-oriented output tasks facilitates attention to the appropriate use of the L2, and that this attention, in turn, may lead to interlanguage changes (see for instance, Alegría de la Colina & García-Mayo, 2006; Edwards et al., 2002; Swain, 1998). While the degree of attention that results from different collaborative tasks and the impact that such attention has on learners' interlanguage restructuring remains debatable, multimedia- and non-technology-based research shows that tasks in which learners collaboratively work with peers to create narratives facilitate attention to the appropriate use of the L2 not only at the lexical, but also at the morphosyntactic level. Thereafter, correction was promoted through peer collaboration during the construction, in Lessons 1 and 3, and reconstruction, in Lessons 2 and 4, of narratives built upon video, aural and written stimuli.

4.4.1.2.2 Feedback on meaning. Different from feedback on form, *Feedback on Meaning* did not overtly draw learners' attention to the use of past tense markers. Rather, it consisted of sentences providing feedback on meaning in response to a statement made by the learner with respect to the content of the multimedia task. Through these sentences, learners were exposed to the appropriate use of past tense. This type of feedback was delivered in Lesson 3 (video-based task) and Lesson 4 (warm-up task). It was hypothesized to push learners to attend to form while they were extracting information from perfective and imperfective markers, to corroborate the accuracy (in meaning) of their responses.

4.4.2 Lexical Complexity

The multimedia comprehension studies reviewed in Chapter 2 showed that unknown vocabulary impedes comprehension of L2 input and, therefore, learners need multimedia assistance to understand new words. Drawing on findings in multimedia research, in the current study, the experimental environments provided assistance through the combined use of pictures and textual definitions. The manner in which this assistance was integrated in the environment is explained in the sections that describe each lesson.

Words unknown to learners were determined through lexical profile analyses that were conducted on all the narratives that learners needed to process. Analyses were made with a French vocabulary profile analyser available through *The Compleat Lexical Tutor* (<http://www.lextutor.ca/vp/fr/>). The profiler analyzes the words from a given text in reference to their frequency of occurrence in a corpus built upon articles from the

French newspaper *Le Monde*⁵ and classifies them into four ranges: 1 to 1000, 1001-2000, 2001 to 3000 frequent words and an off-list range; the latter includes words which are not in the corpus.

Table 4.10

Vocabulary Frequency Profiles for the Multimedia Lessons

Frequency	Lesson 1		Lesson 2		Lesson 3		Lesson 4		%
Range	E1	E2	E1	E2	E1	E2	E1	E2	Average
1 to 1000	89%	85%	73%	89%	79%	73%	79%	79%	81%
1001 to 2000	4%	5%	6%	4%	5%	6%	4%	5%	5%
2001 to 3000	0%	1%	7%	2%	1%	1%	1%	2%	2%
Offlist	7%	9%	14%	5%	15%	20%	16%	14%	13%
Word totals	242	303	187	184	411	425	206	206	

Note: E1 stands for Environment E1, which exposed learners to prototypical marking, whereas E2 stands for Environment E2, which exposed learners to non-prototypical past.

The vocabulary of each lesson was analyzed separately. Results from the lexical profile analyses are provided in Table 4.10. This table shows that most words in all multimedia tasks were listed within the range of the most frequent 0 to 1000 words (for individual analyses of each lesson, see Appendix E). Table 4.10 shows large percentages of words in the offlist range; these words were mostly proper nouns such as Marie-Rose,

⁵ A baseline was needed to establish the degree to which words present in the multimedia tasks were familiar to all learners. This was necessary as learners from different L2 proficiency and L2 exposure profiles were to use the environment. A corpus containing the use of French words by L2 learners would have been a better choice for comparison than a corpus built upon newspaper articles. Yet, this corpus provided a reliable baseline to determine words unknown by the participants, as the result chapter will show later.

Luc, Tit-Jean, Arizona, Québec, France, Canada, etc. Since texts were analyzed, as they would appear in the environment, these offlist words appeared more than once in the narratives, and were thus counted more than once by the lexical profiler, inflating the percentage of unknown words.

Words out of the 2000 range that were not true cognates between Spanish and French were classified as unknown words. For Lesson 3, for instance, the French word *baril* “barrel” was listed out of the 2000 range, but *baril* is a true cognate to the Spanish word *barril*; thus, this word was hypothesized not to hinder comprehension, and was not presented in the vocabulary preparation task. Since the word *guidon* “bicycle handlebar” however, was listed out of the 2000 range and does not resemble its Spanish counterpart *manubrio*, this word was presented to the learner in the form of multimedia annotation.

4.4.3 Multimedia Lessons

The experimental conditions for tense-aspect marking were delivered through four multimediated lessons, which included vocabulary assistance and the tense-aspect task/s with feedback. Lessons were integrated as part of the regular classroom materials and administered weekly over the four-week period from September 11 to October 6, 2007. Each lesson required 60 minutes approximately and was constructed to deliver the target forms through input and output tasks, combining various media modes.

The reader is reminded that the lessons are identical between experimental conditions; it is the type of tense-aspect marking being presented that changes. Table 4.11, on the next page, synthesizes the multimedia nature and form-focussed procedures of the lessons. Vocabulary assistance is described briefly, since vocabulary development was not assessed in the study. The lessons are outlined in the following sections.

Table 4.11

Description of the Multimedia Lessons

Content	Lesson 1	Lesson 2	Lesson 3	Lesson 4
Vocabulary	Multiple- choice	Multiple- choice	Interactive annotations	Multiple- choice task
assistance	sentence completion	listening		with annotations
Activity type	Scrambled sentence task	Multimedia dictogloss	True-false video task	Guided writing
Media stimuli	Interactive written text	Written text & audio	Written text & video	Video & written text
Past tense	Sustained frequency			
Input attentional procedures	Input enhancement (Perfective: blue, imperfective: green)			
Past tense	Absence of temporal adverbials & Input processing			
task	Learner output	Text on the computer	Text on paper	Text on the computer
Feedback type	Metalinguistic prompts	Peer & computer-facilitated	Meaning-oriented	Computer facilitated

4.4.3.1 Lesson 1: Interactive Scrambled Sentence Task

The first multimedia lesson centres upon an interactive reading task. The lesson begins presenting participants with a learning objective: to help learners practice their reading and writing skills in French and learn new vocabulary about fairy tales in Environment E1 and Christmas in Environment E2.

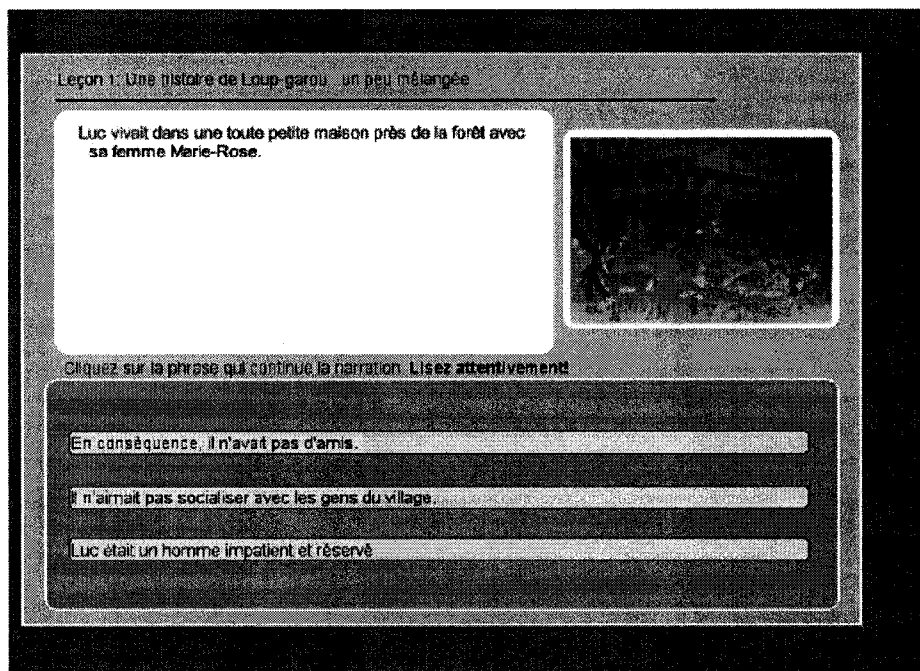


Figure 4.9. Scrambled sentence task in Environment E1

The introduction of the lesson objective was followed by a vocabulary preparation activity, in which learners were exposed to 'unknown' words first with pictures and definitions, and then through a multiple-choice test. Upon completion of the vocabulary task, learners were asked to build a narrative, using sentences presented in scrambled order. The story in the prototypical marking condition was adapted⁶ from the unit *Le Loup-Garou*, implemented by Harley (1989) in her classroom experiment. The story in

⁶ The original text was adapted to present prototypical past tense only; new information, verbs and sentences were then added.

the non-prototypical condition was created around a Christmas narration that a grandmother was telling her grandchildren.

The beginning of the paragraph was provided in the upper part of the screen, as Figure 4.9 illustrates. Learners built the paragraph by clicking on the sentences in a lower screen. If their choice was correct, learners moved to a new screen where the selected sentence was added to the paragraph in the upper screen and a new sentence was added in the lower screen. The sentences were scrambled again and learners selected a new sentence. If an incorrect sentence was selected, learners received feedback in the form of metalinguistic prompts (see Figure 4.10). These prompts varied each time, but they all asked learners to look back at the story paying attention to the events and the manner in which they were presented. After every third erroneous sentence, learners received a *penalty*: they were sent two sentences/screens back in the paragraph construction process.

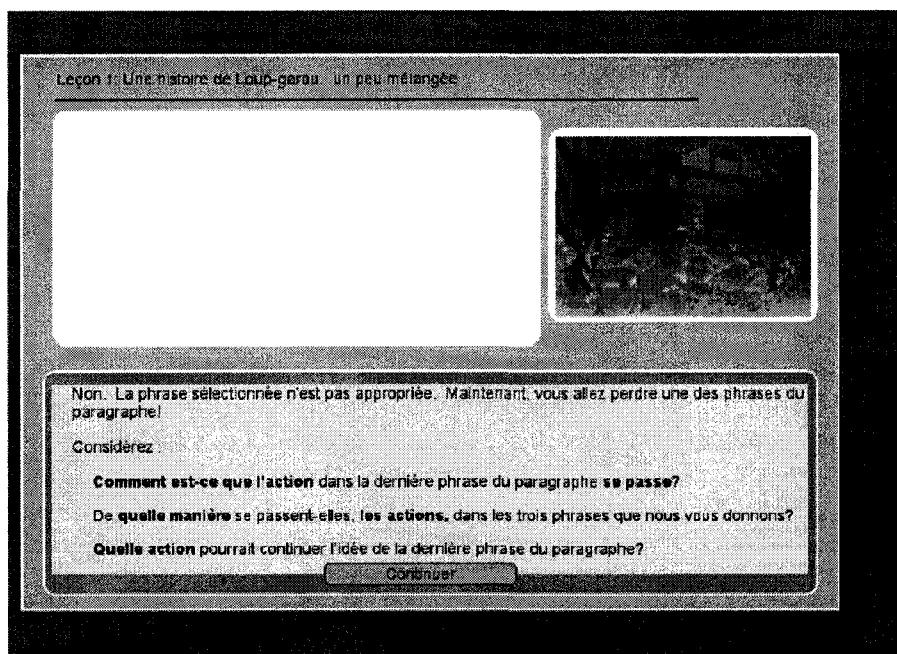


Figure 4.10. Metalinguistic prompts in the scrambled sentence task, Environment E1

After the multimedia task was completed, the whole text was presented, followed by comprehension questions presented individually. After submitting their answer, learners received feedback. Question and feedback sentences included target verbal predicates in the corresponding past tense condition. Then, learners were asked to work with their neighbour to write a narrative to continue the story. In their narratives, learners were asked to integrate specific verbal predicates in specific tenses (see Appendix F).

4.4.3.2 Lesson 2: Multimedia Dictogloss

The second multimedia lesson built upon a listening-based production task known as the dictogloss (Wajnryb, 1990). The passage to which learners were exposed in the prototypical condition continued building upon the instructional unit *Le Loup-Garou* implemented by Harley (1989). The passage in the non-prototypical marking condition continued the Christmas narration from Lesson 1.

The lesson first introduced a learning objective: to provide learners with listening and writing practice in French and to help them extend their vocabulary about fairy tales in Environment E1 and Christmas in Environment E2.

After the presentation of the learning objective, there was a warm-up section to help learners remember the story in Lesson 1. This section consisted of a series of sentences which learners needed to identify as true or false depending on the content of Lesson 1. Sentences were presented individually. After submitting their answer, learners received feedback on meaning. Both the sentence to be identified as true or false and the feedback sentence included target verbal predicates in the learner's past tense condition.

Then, a vocabulary activity was presented. Since learners were to encounter 'unknown' words in the written and oral form in the past tense task, the vocabulary

preparation activity provided learners with aural and written input of the identified words. When learners initialized the vocabulary section, they heard a word, *fée* “fairy”, for instance. Then, the written form of this and three other words, all of them somewhat similar in pronunciation in French, were presented, for example: *fille* “girl,” *frais* “fee,” and *crée*, a slang word for infant. Learners were asked to click on the word they had heard. If they wanted to hear the word again, they could do so by clicking on a ‘repeat the word’ button, as many times as needed. Upon a correct selection, learners were provided with a definition of the word, an example sentence in which the word was used, and a picture to illustrate the meaning of the word, as illustrated in Figure 4.11.

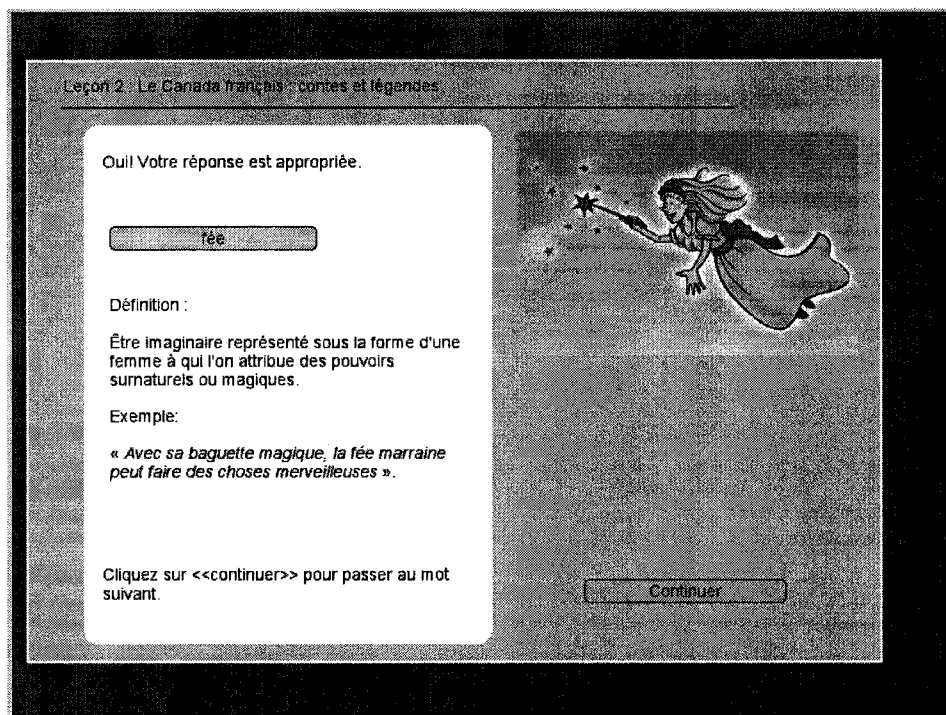


Figure 4.11 Vocabulary preparation example for Lesson 2 (Environment E1)

After the vocabulary section, learners proceeded through a series of stages to rebuild a passage that was read to them on the computer. First, the passage was presented

in writing on the computer screen for 20 seconds. During this time, learners read for meaning; once the time was up, a new screen appeared, asking learners to initialize an audio file. They then listened to the passage, read aloud by a female native speaker of French at normal reading speed. Learners listened to this file three times.

The first time, learners listened to the audio recording trying to retain as much information as possible. The second and third times, learners were requested to take notes as fast as possible while the audio file played. Afterwards, learners worked with a peer for 15 minutes to reconstruct the text using their notes. Once the 15 minutes were up, a sound file activated to catch learners' attention and a computer screen appeared asking learners whether they had completed their paragraphs. At this time, upon indication by the learner, the computer presented the original text, requesting learners to return to their texts and identify those sentences that were missing in their text, as well as those sentences in which their text and that of the computer did not coincide. Finally, they were requested to submit to their teacher a list of sentences that they needed to rework, indicating what the problem was.

4.4.3.3 Lesson 3: True/false Video-watching Task

The third multimedia lesson consisted of a video-watching task. The video file used in the prototypical marking environment was a silent video cartoon of The Pink Panther, showing the *Put-Put, Pink* episode (Ryan, 1968). The video story built upon a series of funny events that The Pink Panther experienced during various rides with his self-built unsafe motorcycles. The video file used in the non-prototypical marking condition presented The Pink Panther in a silent episode called *Pink Panic* (Dunn, 1967).

This episode showed funny events that The Pink Panther experienced while seeking nightly shelter from a storm in a Western ghost town called Dead Dog.

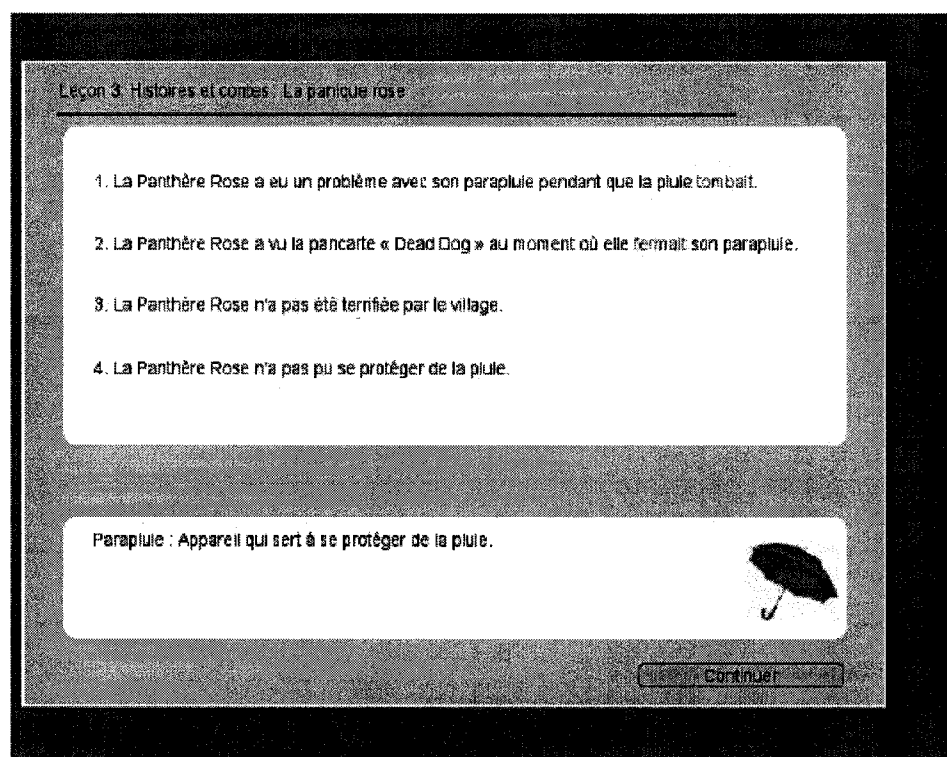


Figure 4.12 Sentence and vocabulary presentation in video-watch task in Environment E2

During this video-based lesson, learners were presented with a series of 32 statements about the story in the video cartoon; based on the content of the video cartoon, learners needed to indicate whether each statement was true or false. The video cartoon was presented in eight segments. Prior to watching each segment, learners received four statements. Each statement included at least one verbal predicate with the target past tense type (see Figure 4.12).

Across sentences, vocabulary assistance in the form of interactive annotations was provided on words that had been identified as 'unknown' through the vocabulary lexical

analyses. In the lower part of the screen, a note indicated that the definition of words X, Y, or Z would be provided in the lower part of the screen if the mouse were placed on them. Textual definitions included pictures, as illustrated in Figure 4.12.

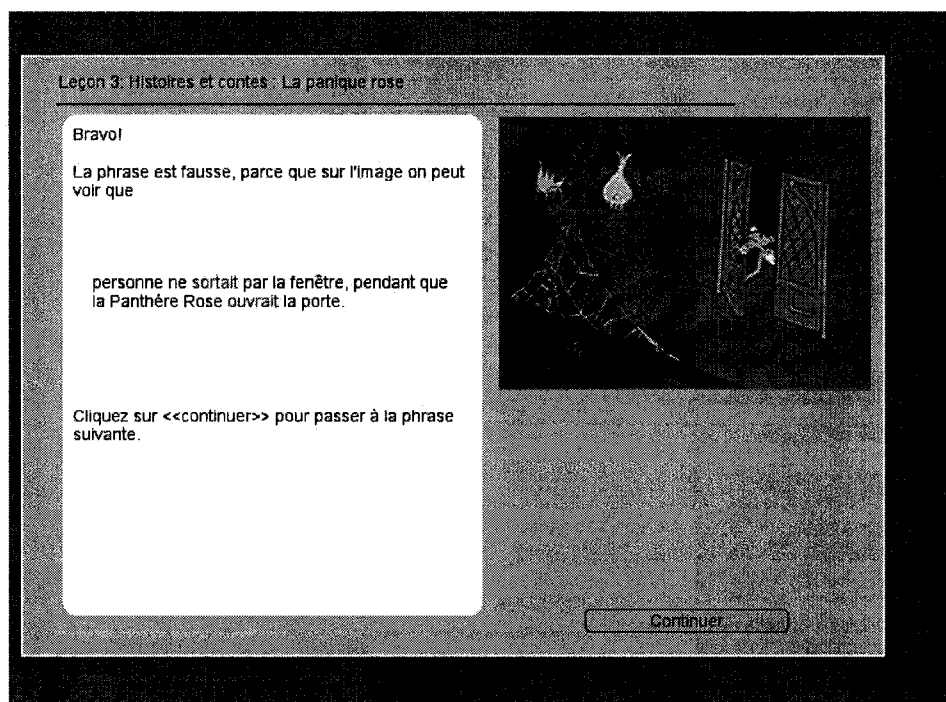


Figure 4.13 Feedback on meaning in the video-watch task in Environment E2

After reading the sentences, learners watched the corresponding video segment. Then, learners were presented with the four statements again and were asked whether they needed to watch the video segment for a second time, or whether they were ready to provide their answers; learners had the choice to re-watch the video segment only once.

When learners were ready to answer, they moved to a computer screen in which they were presented with one statement and two push buttons: *True* and *False*. If the answer was correct, learners received a cheering statement such as *Bravo*, *Oui*, or *Super*, in addition to feedback on meaning (see Figure 4.13). Feedback included a statement

with the target perfective and imperfective forms. If the answer was not correct, learners received a statement indicating their selection was not correct such as: *Non* or *Votre réponse n'est pas appropriée*, and then, they received feedback on meaning. Feedback on meaning was provided with exactly the same sentence in either case, ensuring that all learners received equal exposure to the target forms, regardless of whether their answer choice was correct or not. A picture was also provided, to reinforce the meaning-oriented feedback.

For instance, in the non-prototypical video lesson, learners received the sentence: *La Panthère **entrait** par la porte et un fantôme **sortait** par la fenêtre* “As the Panther enter-IMP through the door, a ghost leave-IMP through a window”. Figure 4.13 shows no one leaving through the window as the panther was entering through the door. If the learner answered ‘*False*,’ the computer provided the following meaning-oriented feedback: *Bravo, si l'on regarde l'image qui provient du dessin animé de la Panthère Rose, on peut voir que personne ne **sortait** par la fenêtre lorsque la Panthère **entrait** par la porte* “Bravo, by looking at the picture from the video cartoon, one can see that no one leave-IMP through the window as The Panther enter-IMP through the door”. If the learner answered ‘*True*,’ then the computer provided the following feedback: *Non, si l'on regarde l'image qui provient du dessin animé de la Panthère Rose, on peut voir que personne ne **sortait** par la fenêtre lorsque la Panthère **entrait** par la porte* [No, by looking at the picture from the video cartoon, one can see that that no one leave-IMP through the window as The Panther enter-IMP through the door]. Both feedback statements were provided with the same picture illustrating the scene.

After the multimedia task was completed, learners worked with their neighbour to summarize the story. In their summary, learners needed to integrate some verbal predicates with specific tenses (see Appendix F).

4.4.3.4 Lesson 4: Multimedia-guided Writing Task

Lesson 4 provided a follow-up to Lesson 3. The principle behind this task was based on the implementation of the dictogloss and the self-correction technique it implies (see Swain, 1998). In this task, students needed to write a newspaper article for a Montreal-based newspaper that published funny stories.

After initializing Lesson 4, learners were provided with a learning objective: to help them practice their writing skills and expand their vocabulary. Prior to the writing task, learners were presented with a warm-up activity to help them remember aspects of the story they had watched the week before. This task also served as a vocabulary preparation/presentation stage.

Learners were presented with eight pictures separately and had to determine whether the pictures belonged to the video story they had watched or not. Five pictures related to the video. A vocabulary section followed each of these five pictures: learners were provided with three verbal predicates and asked to click on the predicate that related to the picture the best, as illustrated in Figure 4.14. In these predicates, annotations were provided to support new vocabulary comprehension, following the design in Lesson 3.

If the selected predicate was correct, learners were provided with a cheering statement such as *Bravo*, *Oui*, or *Super*, and an explanation (feedback on meaning) on how this sentence related to the picture and the video story. The explanation included a target verbal predicate in perfective or imperfective. If the answer was not correct,

learners received a statement indicating their selection was not correct and received a short explanation on which of the three choices related the most to the picture. The explanation included the same target verbal predicate in perfective or imperfective that was provided to learners who had answered appropriately.

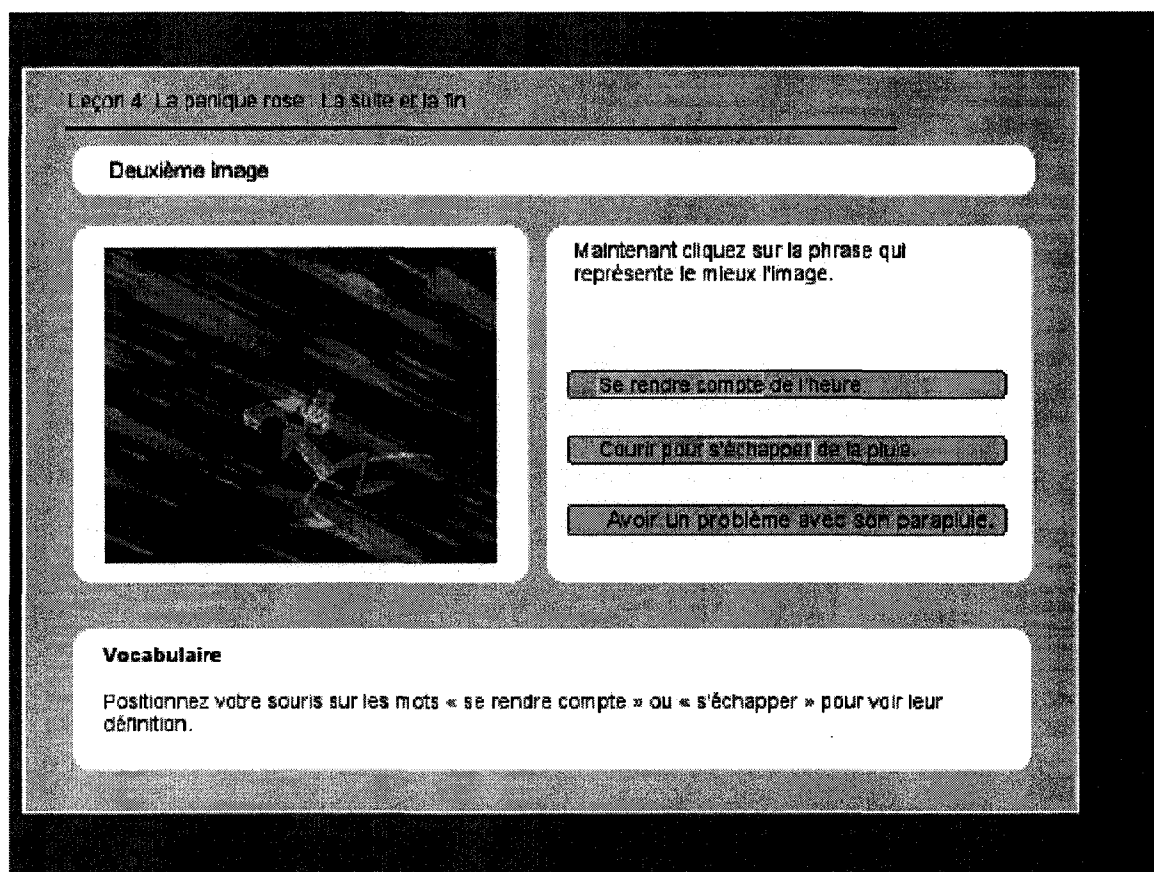


Figure 4.14 Vocabulary/Warm-up task for Lesson 4 in Environment E2

Figure 4.14, for instance, illustrates three French predicates that Environment E2 provided learners along with the picture of the Pink Panther under the rain with a broken umbrella: (a) to realize what time it is, (b) to hide from the rain, and (c) to have a problem with the umbrella. If learners clicked on predicate 3, the following feedback

appeared in French: Yes, this statement closely relates to the picture, which illustrates that the Panther have-PER a problem with his umbrella as the rain fall-IMP. If learners selected a wrong sentence, the following explanation was provided: No, this statement does not relate to the picture, because the picture illustrates a video segment in which: the Panther have-PER a problem with his umbrella as the rain fall-IMP. Therefore, the predicate “to have a problem with the umbrella” was the correct choice.

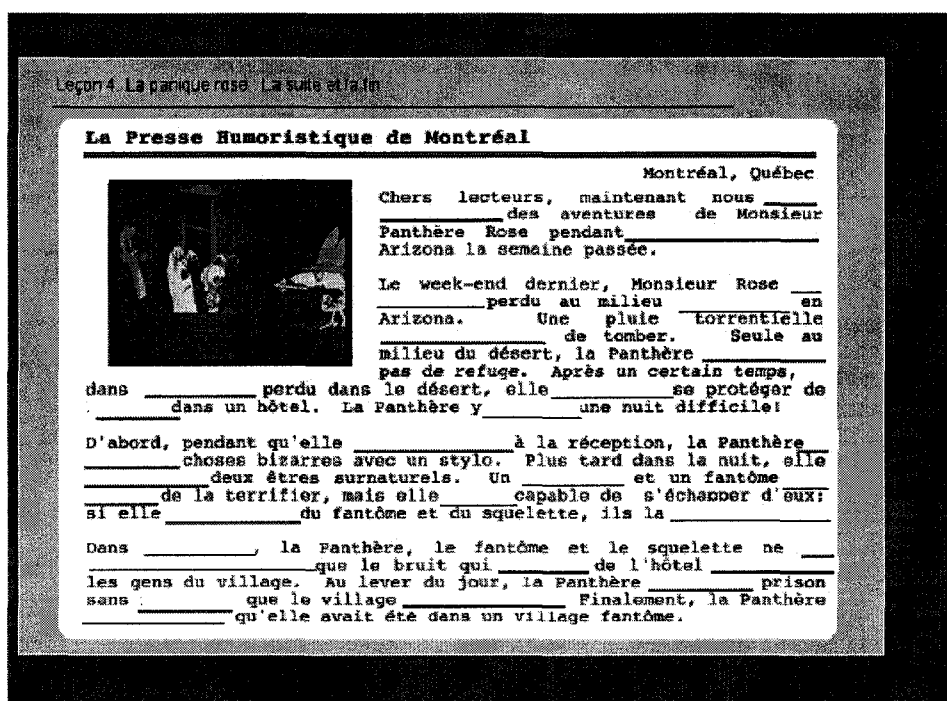


Figure 4.15 Environment 2 Lesson 4 newspaper article with blanks

Upon completion of the warm-up task, learners then had to complete the newspaper article. To complete this writing task, learners were requested to read a newspaper article for two minutes and retain as much information as possible. The article was then presented again, but this time some sections of the article had been removed, as Figure 4.15 shows.

Learners were given a printout of the screen, as the image in Figure 4.15, and had 15 minutes to complete the story with their peers. Missing sections consisted of target verbs in past tense (e.g., *a vécu* “live-PER”), adverbial phrases of time⁷ (e.g., *un peu plus tard* “a little later”) lexical items (e.g., *squelette* “skeleton”), and adverbial phrases of place (e.g., *en Arizona* “in Arizona,” *au milieu du désert* “in the middle of the desert”). When the 15 minutes were up, a new computer screen appeared; lexical items and adverbial phrases were given. Target verbs were also provided in parentheses in their corresponding places, but they were in infinitive form. The computer asked learners (1) to identify those sentences that were missing in their text and (2) to complete the sentences with the verbs given. Learners were given ten minutes to integrate these verbs into their paragraphs and make any necessary changes. Once time was up, the computer presented the original newspaper article, requesting learners to identify those sentences in which their text and that of the computer did not coincide. Finally, learners were requested to correct their texts and submit them.

4.4.4 Verbal Predicates

Each environment exposed participants to 212 verbal predicates. The selection of the 212 verbal predicates was made using a series of telic, dynamic, and punctuality tests. The results of these tests permitted the classification of the predicates as statives, activities, accomplishments or achievements (see Appendix D for a list of verbal predicates per lesson and their lexical category in order of appearance in the environment).

⁷ These adverbial phrases of time are different from temporal adverbials, in that they serve to build sequence (e.g., a bit later, afterwards) and not to indicate how actions unfold over time (e.g., often, always)

The first test run on the predicates was a telicity test adapted from Bardovi-Harlig's (2000) publication, to classify each predicate as either telic or atelic. The test consisted of turning each verbal predicate into the following question: if action X is interrupted in the middle of its course, will it have taken place? When the answer was affirmative, the verbal predicate was classified as atelic, as it did not have an inherent end and, therefore, the action could be stopped at any time. If the answer was negative, the verbal predicate was telic, as the action needed to reach an inherent end to occur.

In the case of the predicate: *marcher dans la forêt* "to walk in the forest," the test ran as follows: if I stop the action of *walking in the forest* in the middle of its course, would I have already walked in the forest? The answer was affirmative; the predicate was then atelic. In the case of the predicate: *marcher dans la forêt pendant une heure* "to walk for an hour in the forest" the test ran as follows: if I stop the action of *walking for an hour in the forest*, would I have already walked for an hour in the forest? The answer was negative; if the action stops its course, then one would not have walked for an hour, and thus, the action was telic.

Drawing on the classification of lexical properties proposed by Andersen (1991), atelic predicates were further subdivided into atelic predicates not requiring input of energy (i.e., statives) and atelic predicates requiring input of energy (i.e., activities). The energy input distinction among atelic predicates was drawn asking the following question: Does the realization of action X require any physical effort? If the answer was affirmative, then the verbal predicate was classified as an activity; if the answer was negative then the predicate was classified as a stative. For the atelic predicate *marcher dans la forêt*, the answer to the testing question was affirmative, and thus, this predicate

was classified as an activity. For the atelic predicate *aimer le chocolat* “to like chocolate,” the answer to the testing question was negative; thus, this predicate was classified as a stative.

The same classification of lexical properties proposed by Andersen (1991) was used to further subdivide telic predicates into telic predicates whose action takes place immediately (i.e., achievements) and telic predicates whose action takes place overtime (i.e., accomplishments). The distinction among telic predicates was drawn asking the following question: Does the realization of action X require a period of time to occur? Or, would its realization take place immediately? If the answer was ‘it requires a period of time to occur’, then the verbal predicate was classified as an accomplishment; if the answer was ‘its realization takes place immediately’, then the predicate was classified as an achievement. For the telic predicate *marcher pendant une heure dans la forêt*, the answer to the testing question was ‘it requires a period of time to occur’, and thus, this predicate was classified as an accomplishment. For the telic predicate *entrer dans la chambre* “to come into the room”, the answer to the testing question was ‘it would take place immediately;’ thus, this predicate was classified as an achievement.

The lexical property test was run on the verbal predicates by the researcher and by a native speaker of French⁸. There was 100% agreement on the classification of the 212 verbal predicates that were presented in each environment. It should be noted, however, that these verbal predicates constituted the final database that resulted from analyses of

⁸ This native speaker was an SLA PhD student who had previously collaborated with the researcher in two projects investigating the role of lexical aspect in the acquisition of French among Hispanophones. Since she was familiar with the tense-aspect literature and lexical tests, she did not receive training on the lexical tests for the current study.

several verbal predicates. It should also be noted that the environments presented the same number of *verbal predicate types*, and not the exact same verbal predicates, as verbal predicates needed to be built into meaning-oriented texts in congruence with the topic of the contextualized multimedia situation.

Table 4.20

Distribution of Verbal Predicates per Lesson

Predicate Type	Lesson 1	Lesson 2	Lesson 3	Lesson 4	lexAsp (raw)	lexAsp (%)
<u>Statives</u>						
(e.g., <i>to like Christmas</i>)	16	12	21	7	56	26%
<u>Activities</u>						
(e.g., <i>to walk in the woods</i>)	5	13	27	5	50	24%
<u>Accomplishments</u>						
(e.g., <i>to sing a song</i>)	3	0	9	1	13	6%
<u>Achievements</u>						
(e.g., <i>to come into the room</i>)	29	5	49	10	93	44%
Total (raw)	53	30	106	23	212	100%
Total (%)	25%	14%	50%	11%		

Note: Percentages were calculated, dividing the raw totals by the total number of predicates, which were then multiplied by 100 and rounded off

For instance, Lesson 1 included five atelic predicates of the type *activity* in both experimental environments, but the actual predicates were different given the theme upon which the past contexts were built. In the prototypical condition, three predicates were: *travailler à la ferme* “to work on the farm,” *dormir dans son lit* “to sleep in bed,” *déjeuner dans la cuisine* “to have breakfast in the kitchen,” and were part of a tale about two people living in the woods; whereas in the non-prototypical condition, three predicates were *fêter Noël* “to celebrate Christmas,” *attendre le Père Noël* “to wait for Santa Claus,” *voir le Père Noël* “to see Santa Claus,” and were built to into a Christmas anecdote.

Table 4.20 shows the distribution of the 212 verbal predicates across lessons in each experimental condition (read totals in the bottom row) and the distribution of verbal predicates per lexical aspect categories (read total under *lexAsp* raw and %). With respect to the distribution of the verbal predicates across lessons, Table 4.20 shows that 25% of the 212 verbal predicates were presented in Lesson 1, 14% in Lesson 2, 50% in Lesson 3, and 11% in Lesson 4.

The unequal distribution of predicates across lessons was due to the complexity of the multimedia lessons. Lesson 2, for instance, included 30 predicates only, because they were delivered through a listening task that exposed participants to all target predicates at once during an oral narrative. However, this oral narrative was presented to learners three times through an audio file and twice in the form of a written text, providing learners with multiple opportunities to process the target predicates. This small number of 30 predicates contrasts with the 106 verbal predicates that learners were exposed to in Lesson 3. But, in Lesson 3, the predicates were not presented all at once. Rather, they

were separated and presented during different video-watching stages. During the watching stage, predicates were further separated to accompany eight video segments.

Table 4.20 shows that of the 212 predicates, 106 were atelic ones divided into 56 statives and 50 activities. The other half of the verbal predicates was of the telic type, divided into 13 accomplishments⁹ and 93 achievements. As a result, through their interaction with the environment, of all predicates learners dealt with, 50% were atelic and 50% were telic. As the two following sections explain, these predicates appeared in prototypical or non-prototypical past, depending on the learning experimental condition.

4.4.5 Multimedia Past Tense Instruction

The number of verbal predicates previously indicated were built into the form-focussed lessons to engage learners in the use of the past tense in prototypical or non-prototypical contexts, as it will be explained in the two sections that follow.

4.4.5.1 Prototypical Instruction (Environment E1)

In the *prototypical marking* instructional environment, the functional values of perfective and imperfective markers coincide with the semantic properties of verbal predicates. Table 4.21 summarizes the distribution of the 212 verbal predicates with perfective and imperfective markers in the prototypical condition.

⁹ The number of accomplishment predicates included in the experimental environments is small in comparison to the other types of verbal predicates, because in a previous study (Izquierdo, 2006), learners from the same population demonstrated more control over the use of perfective and imperfective markers with this type of verbal predicates. The use of non-prototypical marking with statives, activities, and achievements remained a challenge, however. Therefore, the pedagogical treatment emphasized achievement telics more than accomplishment telics. In addition, this study investigated the impact of the multimedia treatment on the prototypical and non-prototypical use of the perfective and imperfective with telics and atelics categories, and not on each of the four verbal predicate types. Therefore, during the analyses of the data the accomplishment category was merged with achievements and analyzed as a telic category.

In this environment, perfective markers indicated the completion of an action and this value of completion aligned with the inherent semantic properties of telic verbal predicates, as in these predicates the action had an inherent end (e.g., *to walk 1 kilometre* and *to close the door*). Thus, in this condition, telic predicates appeared with perfective as in:

- Accomplishment: *J'ai marché 1 kilomètre* “I walk-PER 1 kilometre”
- Achievements: *J'ai fermé la porte* “I close-PER the door”

Imperfective markers were used to describe the manner in which actions unfolded over time (i.e., habituality, frequentation, progression, and continuity)¹⁰ and this function aligned with the inherent semantic properties of atelic verbal predicates, as in these predicates actions spanned over time without an inherent end (e.g., *to work at the university* and *to like chocolate*). Thus, in the prototypical condition, atelic predicates appeared with imperfective exposing learners to sentences such as:

- Statives: *J'aimais le chocolat* “I like-IMP the chocolate”
- Activities: *Je travaillais à l'université* “I work-IMP at the
university”

4.4.5.2 Non-prototypical Instruction (Environment E2)

In the *non-prototypical past* environment, the functional values of perfective and imperfective markers contradicted the semantic properties of verbal predicates. Table

¹⁰ At early stages in the design of the study, the attempt to control the frequency of each of these functional values was made, but the meaning-oriented nature of all the multimedia tasks and the contexts in which past tense markers were used impeded the creation of natural-sounding and coherent narratives when the frequency of the imperfective values was controlled.

4.21 summarizes the distribution of the 212 verbal predicates with perfective and imperfective markers to which learners are exposed to in the non-prototypical condition.

Table 4.21

Distribution of Verbal Predicates in the Environments

Type of predicates	Environment E1		Environment E2	
	(Prototypical past)		(Non-prototypical past)	
	Perfective	Imperfective	Perfective	Imperfective
Statives		56 (26%)	56 (26%)	
Activities		50 (24%)	50 (24%)	
Accomplishments	13 (6%)			13 (6%)
Achievements	93 (44%)			93 (44%)
Total	106 (50%)	106 (50%)	106 (50%)	106 (50%)

Numbers in parentheses indicate the percentage of verbal predicates per predicate type with respect to the total number of predicates present in the environment ($n = 212$).

In the non-prototypical environment, participants required perfective to mark the completion of an atelic action. This perfective value of completion conflicted with the inherent semantic properties of atelic predicates, insofar as in these predicates actions spanned over time without an inherent end (e.g., *to work at the university* and *to like chocolate*). Thus, in this environment, atelic predicates appeared with perfective as in:

- Statives: *J'ai aimé le chocolat* [I like-PER the chocolate]
- Activities: *J'ai travaillé à l'université* [I work-PER at the university]

In this environment, imperfective was needed to describe the manner in which telic actions spanned over time (i.e., habituality, frequentation, progression, and continuity). This imperfective function contradicted the inherent semantics of telic verbal predicates, as in these predicates the action had an inherent end (e.g., *to walk 1 kilometre* and *to close the door*). Thus, in the non-prototypical condition, telic predicates were presented with imperfective, exposing learners to process sentences such as:

- Accomplishment: *Je marchais 1 kilomètre* [I walk-PER 1 kilometre]
- Achievements: *Je fermais la porte* [I close-PER the door].

The section 4.4.1 described the procedures that were implemented in the L2 learning environments, to draw learners' attention to past tense use in the prototypical and non-prototypical contexts across the multimedia lessons.

4.5 Assignment of Experimental Multimedia Learning Condition

The effects of the two previously described instructional environments on L2 grammar acquisition were observed among learners from two past tense developmental stages, and participants were assigned to one of four different L2 multimedia-learning conditions. As it was indicated earlier, the combination of the two different levels of past tense developmental readiness with one of the two learning environments facilitated the observation of L2 past tense development in four experimental multimedia instructional conditions. The procedures to assign learners to the experimental conditions are now described.

4.5.1. Developmental Condition

Prior to the implementation of the multimedia environments, learners completed a tense-aspect cloze test, to determine their past tense developmental stage. The test included 20 passages eliciting the meaning-oriented use of perfective and imperfective markers in equal number of obligatory contexts for prototypical ($n = 25$) and non-prototypical marking ($n = 25$) (further details on the test, its implementation and its scoring procedures are provided under *cloze test* in the data collection section).

Based on the percentage of appropriate use¹¹ of past tense marking in the test, learners were then classified into one of two developmental groups: *non-developmentally ready* (NR) and *developmentally ready* (RD) for non-prototypical past tense. Participants' scores in the cloze test ranged from 40 to 94 % in appropriate past tense use. Learners within the 40-68% range were classified as *non-developmentally ready*. Learners above 68% were classified as being *developmentally ready*. Results of ANOVA analyses, presented in Chapter 5, revealed that group mean differences were statistically significant and that learners in the RD condition ($n = 29$) exhibited better use of past tense markers in non-prototypical contexts than their NR counterparts ($n = 25$).

4.5.2. Learning Environment

Learners from each developmental condition were then assigned to one of the two multimedia-environments: Environment E1 (prototypical past tense learning

¹¹ Appropriate use refers to a recognizable attempt at the required grammatical aspect for the context. Accurate use recognises the well formedness of the form, with respect to choice of the auxiliary, gender, and number agreements. The perfective in the sentence **Hier je suis acheté une voiture* is appropriate, but it is not accurate due to the use of *être* instead of *avoir* (for further discussion of appropriate vs. accurate use see Bardovi-Harlig & Bergström, 1996; Bardovi-Harlig, 2000).

environment) or Environment E2 (non-prototypical past tense learning environment). This combination facilitated the examination of the effects of four multimedia-learning conditions on L2 grammar changes among young-adult university learners of French:

E1-NR Learners in this condition ($n = 12$) were not developmentally ready for the use of non-prototypical marking and were exposed to environment E1, which restricted their perfective and imperfective use to past tense forms in line with their current developmental competencies: prototypical marking.

E1-RD Learners in this condition ($n = 12$) were developmentally ready for non-prototypical marking, but were exposed to environment E1, which restricted their perfective and imperfective marking to past tense forms below their current developmental competencies: prototypical marking.

E2-NR Learners in this condition ($n = 13$) were not developmentally ready for non-prototypical past, but were exposed to environment E2, which restricted their perfective and imperfective marking to past tense forms ahead of their current developmental competencies: non-prototypical marking.

E2-RD Learners in this condition ($n = 17$) were developmentally ready for the use of non-prototypical marking and were exposed to environment E2, which restricted their perfective and imperfective marking to past tense forms in line with their current developmental needs: non-prototypical marking.

Table 4.22 shows that of the 25 learners in the NR condition, 12 were assigned to Environment E1 and 13 were assigned to Environment E2. From the 29 learners in the

RD condition, 12 were assigned to Environment E1 and 17 to environment E2. This, in turn, led to a total of 24 participants working with Environment E1 and 30 participants using Environment E2.

Table 4.22

Participant Distribution across Experimental Multimedia Learning Conditions

Experimental Group	Environment	Developmental Condition	<i>n</i>	Gender	
				M	F
E1-NR	E1	NR	12	4	8
E1-RD	E1	RD	12	4	8
E2-NR	E2	NR	13	2	11
E2-RD	E2	RD	17	7	10
Total			54	17	37

4.5.3 Lesson Administration

Lessons were administered weekly over the four-week period from September 11, 2006 to October 6, 2006 at the university's Computing Commons, located across from the Language Centre. The computer room assigned for the research project included two aisles of computer stations with 16 computers each. Each computer station aisle comprised two computer station rows with eight computers each. The original distribution of the computers was used to outline the different multimedia learning conditions. Figure 4.16 illustrates the assignment of students in the computer room¹².

¹² Due to ethical reasons, this figure illustrates the principle behind the organization of the computer lab, but not its actual configuration during the project.

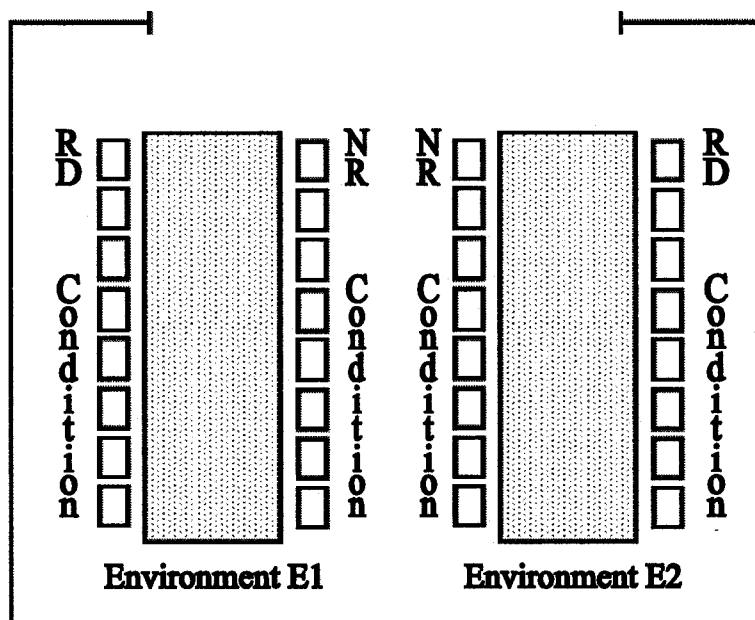


Figure 4.16 Experimental conditions in the computer lab

Environment E1 was installed on the computers in one of the aisles, and Environment E2 was installed on the computers in the second aisle. Within each aisle, one row was assigned to RD participants and one row to NR participants. This seating arrangement further ensured that during collaborative work, learners would interact with peers using the same environment and within the same developmental condition.

Participants were assigned to the row that corresponded to their experimental condition the day of the multimedia lesson, as they came in the computer room.

4.6 Data Collection Instruments

The effects of the L2 multimedia learning environments on learners' past tense use were documented through past tense tests and computer lab and classroom documentations. Past tense tests measured changes in perfective and imperfective use in

prototypical and non-prototypical contexts. Computer lab and classroom documentations were used to identify variables that may have influenced the effectiveness of the multimedia environment, such as learners' attitudes and attention to the materials and classroom teaching practices. All the data collection instruments used are described in the sections that follow.

4.6.1 Past Tense Tests

Past tense tests included three different testing instruments that were administered prior to, immediately after, and three weeks after the implementation of the multimedia lessons; that was during the weeks of September 15, October 2, and October 23, 2006. Past tense tests consisted of a cloze task, which was also the developmental condition grouping instrument, a computer situational task and a computerized listening preference task.

These tests were selected instead of freer tasks (e.g., interviews or written narratives), because they allowed for control over the distribution of past tense markers within and across verb types, making databases comparable between and within experimental conditions (for further discussion of the benefits and limitations of these types of materials see, for instance, Ayoun, 2005; Bardovi-Harlig, 2002). Oral tasks were not administered, as pronunciation similarity between past tense forms, discussed in Chapter 3 and described in more detail under the 'Listening Preference Task' section, would have jeopardized the reliability of oral data coding and analyses.

Two versions of each test were developed: A and B and counterbalanced versions were administered each time. Among the initial participating population, equal numbers of tests were administered within each learning condition. Test versions were alternated

between testing times. Table 4.23 shows that 30 participants received the tests in A-B-A order across testing times, whereas 24 participants received the tests in B-A-B order. Participants received the same test version at the pre-test and delayed post-test times on the assumption that during the seven week period between these two testing times, learners would not remember their initial answers and would have forgotten the test items. Further, Table 4.23 shows that almost equal numbers of test versions were distributed within experimental groups; the only exception was group E1-RD, where 75% of the participants received the tests in A-B-A form, whereas 25% did in B-A-B format. Statistical analyses presented in Chapter 5 show that there were no significant mean differences between test versions within testing times, confirming the use of two different forms did not affect test results.

Table 4.23

Administration of Test Versions per Experimental Group

Experimental Group	<i>n</i>	Test Versions Across Test Times		
		Pre	Immediate	Delayed
E1-NR	5	A	B	A
<i>n</i> =12	7	B	A	B
E1-RD	9	A	B	A
<i>n</i> =12	3	B	A	B
E2-NR	7	A	B	A
<i>n</i> =13	6	B	A	B
E2-RD	9	A	B	A
<i>n</i> =17	8	B	A	B

4.6.1.1 Cloze Task

This task was constructed following the design of previous studies documenting the distribution of tense-aspect markers with verb types with learners from different L2 past tense proficiency levels (Bardovi-Harlig & Reynolds, 1995; Collins, 1999, 2004). Version A of the cloze task and its scoring procedures had been implemented in two previous studies documenting the development of the perfective and imperfective distinction with similar populations at the same participating university (Izquierdo, 2006; Izquierdo & Collins, in press). Version B was developed for this experimental study, respecting the design and verbal predicates in version A.

4.6.1.1.1 Organization. The cloze task included 20 passages presenting independent situations (see Examples 4.1 and 4.2 in Appendix B2, for samples of the cloze task). In these passages, learners were provided with 64 verbs in their basic form. Learners needed to inflect each verb for present, past or future so that the inflected form would fit the meaning of the contextual situation. There were 50 target contexts for the use of past tense markers; the other 14 contexts included present and future and functioned as distractors.

Table 4.24 shows that the cloze task included equal numbers of obligatory contexts for prototypical ($n = 25$) and non-prototypical marking ($n = 25$) as determined by a control group of 14 French native speakers¹³; these contexts were distributed for perfective and imperfective marking with telic and atelic predicates. The 25 non-

¹³ All tests were piloted with university-educated native speakers of French. The final numbers of items reported on here were cases in which there was agreement across native speakers. The number of native speakers with whom the tests were piloted varied and is reported in the sections that describe each test.

prototypical contexts were composed by the use of perfective with 15 atelic predicates and the use of imperfective with ten telic predicates.

Table 4.24

Perfective and Imperfective Tokens with Verbal Predicates in the Cloze Task

Type of verbal predicate	Perfective	Imperfective
Statives	10	10
Activities	5	5
Accomplishments	5	5
Achievements	5	5
Total	25	25

Note: Numbers in shaded areas indicate non-prototypical marking cases; numbers in non-shaded areas represent prototypical marking cases.

Both test versions were identical in the number of verbal predicates, the actual verbal predicates, and the combinations of verbal predicates with tense-aspect markers. Test samples provided in Appendix B2 (i.e., Examples 4.1 and 4.2) show that in both test versions, participants needed to complete the cloze task with the same target verbs and that in both tests, the context required the use of *monter* “to climb” with imperfective, *dormir* “to sleep” with perfective and *quitter* “to leave” with imperfective.

4.6.1.1.2 Administration. At the pre-test time, teachers received a set of tests per class with equal numbers of test versions and administered them in the classroom. Test versions were alternated within the test set, to make sure equal numbers of each form

were distributed. Cloze tests were administered on a Friday and lists of participants within each version were generated over the weekend, to provide participants with the corresponding computerized versions of the two other tests the following Monday. To administer the appropriate test version during the immediate and delayed post-tests, teachers received the cloze tasks with the name of the learners on them and distributed them accordingly.

Within the French level III and IV classes, most participants required a full hour to complete the test. Within the highest-level classes, French V and VI, learners completed the test within 45 minutes maximum. Students were instructed to solicit assistance from their teacher with respect to unknown vocabulary.

4.6.1.2 Situational Task

This type of test has been used in previous research, to document learners' preferences for tense aspect markers with verb types in French L2 at different past tense proficiency levels (e.g., Clemance, 2004). The tests created for the current study were based on the design of paper-and-pencil versions implemented by Clemance (2004), who documented the development of tense-aspect markers among university-level English-speaking learners of French.

4.6.1.2.1 Organization. This test was computerized and included 30 small independent situations. For each situation, learners received two sentences that they needed to judge as true or false with respect to the situation (see Figures 4.17 and 4.18 in Appendix B2, for screen samples). Next to each sentence, learners had two radio buttons: one for *True* and one for *False*. Once learners highlighted the radio buttons

indicating their answers, they clicked on a push button to submit their answers and the next situation then appeared.

Table 4.25 shows that there were 24 target contexts for the use of past tense markers, in addition to 6 situations that functioned as distractors. The target past tense contexts included equal number of true sentences for prototypical ($n = 12$) and non-prototypical marking ($n = 12$). Contexts were equally distributed for perfective and imperfective marking with telic and atelic predicates. For target situations, only one of the two sentences was true, as determined by nine French native speakers with whom paper and pencil versions of the test were piloted. For distractor situations both sentences could be either true or false. Two of the distractor sentences were in past.

Table 4.25

Perfective and Imperfective Tokens with Verbal Predicates in the Situational Task

Type of verbal predicate	Perfective	Imperfective
Statives	3	3
Activities	3	3
Accomplishments	3	3
Achievements	3	3
Total	12	12

Legend: Numbers in shaded areas indicate non-prototypical marking cases; numbers in non-shaded areas present prototypical-marking cases.

Versions A and B were identical in the number of verbal predicates, the actual verbal predicates, and the combinations of verbal predicates with tense-aspect markers. Verbal predicates were presented in identical order. Samples from both test versions provided in Appendix B2 (Figures 4.17 and 4.18) illustrate a non-prototypical context for the use of perfective with the statives verb *savoir* “to know.” In both versions, learners were presented with a situation that would lead them to indicate that the sentence with perfective was true, and that the sentence in imperfective was false.

4.6.1.2.2 Administration. This test was administered in the computer lab. Test version A was installed in one of the computer aisles and version B in the other. Upon their arrival, learners were assigned to work in their corresponding test version isle. A set of instructions and four example-situations were presented after the initialization of the test. Examples included sentences similar to distractor ones. These examples served to show learners that all possible true-false combinations could occur throughout the situations presented in the test: true/true, true/false, false/true, and false/false. Learners had the opportunity to go through the example section twice.

The completion of the test required about 20 minutes in French classes level IV, V and VI and about 30 minutes within level III. Students were instructed to request help from their teacher, the researcher, or the research assistant with respect to words that they were not able to understand during the situations.

4.6.1.3 Listening Preference Test

This test was computerized and developed from the hypothesis that similarities in pronunciation of French forms may hinder the development of the perfective and

imperfective distinction, as learners may not be able to discriminate these forms in the L2 aural input (Harley, 1986; Lyster, 2007).

The hypothesis behind the implementation of this test was that if learners were not able to discriminate perfective and imperfective forms in the target predicates from aural input, this would limit their understanding of how perfective and imperfective are used in the L2. As a consequence, they would prefer prototypical to non-prototypical marking in the target predicates. Then, the administration of this test would also help capture changes on learners' understanding of how past tense marking works in French.

The following four cases in which perfective and imperfective would sound similar to learners were identified and examples were integrated in the test accordingly. This list of cases is by no means exhaustive, but illustrates the cases that were considered for the creation of the listening preference test.

1. Regular verbs which in infinitive have the *-er* ending, classified in French as first-group verbs (i.e., *verbes du premier groupe*) such as *quitter* “to leave,” *travailler* “to work,” *manger* “to eat,” and appear in conjunction with the first person singular (i.e., *je/j*’ “I”) as in:
 - *Quitter : J’ai quitté la maison* versus *je quittais la maison*
“I leave-PER home” versus “I leave-IMP home”
 - *Travailler : J’ai travaillé à la maison* versus *je travaillais à la maison*
“I work-PER at home” versus “I work-IMP at home”
2. First-group verbs which start with the vowel *a* or the syllable *ha* as in *adorer* “to like/adore/love,” or *habiter* “to live/inhabit” and appear in conjunction with the:

- a. first person singular (i.e., *je/j'* “I”), as in
- *Adorer : J’ai adoré la maison* versus *j’adorais la maison*
 “I love-PER the house” versus “I love-IMP the house”
 - *Habiter : J’ai habité à Mexico* versus *j’habitais à Mexico*
 “I live-PER in Mexico” versus “I live-IMP in Mexico”
- b. informal second person singular (i.e., *tu* “you;” in colloquial oral discourse *tu* can be contracted when the verb that follows starts with a vowel, *t’*, which, in turn, makes it more difficult to discriminate perfective from imperfective)
- *Adorer : Tu as adoré la maison* versus *tu adorais la maison*
 “You love-PER the house” versus “You love-IMP the house”
 - *Adorer : T’as adoré la maison* versus *t’adorais la maison*
 “You-contracted love-PER the house” versus
 “You-contracted love-IMP the house”
 - *Habiter : Tu as habité à Mexico* versus *tu habitais à Mexico*
 “You live-PER in Mexico” versus “You live-IMP in Mexico”
 - *Habiter : T’as habité à Mexico* versus *t’habitais à Mexico*
 “You-contracted live-PER in Mexico” versus
 “You-contracted live-IMP in Mexico”
- c. third person singular pronouns (i.e., *il* “he,” *elle* “she” and the impersonal pronoun *on* “one” which is also used as an informal pronoun for *nous* “we”):
- *Adorer : Il a adoré la maison* versus *il adorait la maison*

"He love-PER the house" versus "he love-IMP the house"

- *Adorer : Elle a adoré la maison* versus *elle adorait la maison*

"She love-PER the house" versus "she love-IMP the house"

- *Adorer : On a adoré la maison* versus *on adorait la maison*

"One love-PER the house" versus "one love-IMP the house"

- *Habiter : Il a habité à Mexico* versus *il habitait à Mexico*

"He live-PER in Mexico" versus "he live-IMP in Mexico"

- *Habiter : Elle a habité à Mexico* versus *elle habitait à Mexico*

"She live-PER in Mexico" versus "she live-IMP in Mexico"

- *Habiter : On a habité à Mexico* versus *on habitait à Mexico*

"One live-PER in Mexico" versus "one live-IMP in Mexico"

3. First-group verbs which are reflexive, such as *se réveiller* "to wake up" or *se doucher* "to take a shower" and appear jointly with the:

- a. informal second person singular (i.e., tu "you")

- *se réveiller : Tu t'es réveillé à 8h00* versus *tu te réveillais à 8h00*

"You reflexive pronoun wake up-PER at 8:00" versus

"You reflexive pronoun wake up-IMP at 8:00"

- *se doucher : Tu t'es douché à 8h00* versus *tu te douchais à Mexico*

"You reflexive pronoun take-PER a shower at 8:00" versus

"You reflexive pronoun take-IMP a shower at 8:00"

b. third person singular pronouns (i.e., *il* “he,” *elle* “she” and the impersonal pronoun “*on*” which is also used as an informal pronoun for *nous* “we”):

○ *se réveiller: Il s’est réveillé à 8h00* versus *il se réveillait à 8h00*

"He reflexive pronoun wake up-PER at 8:00" versus

"He reflexive pronoun wake up-IMP at 8:00"

○ *se réveiller : Elle s’est réveillée à 8h00* versus *elle se réveillait à 8h00*

"She reflexive pronoun wake up-PER at 8:00" versus

"She reflexive pronoun wake up-IMP at 8:00"

○ *se réveiller : On s’est réveillé à 8h00* versus *on se réveillait à 8h00*

"One reflexive pronoun wake up-PER at 8:00" versus

"One reflexive pronoun wake up-IMP at 8:00"

○ *se doucher : Il s’est douché à 8h00* versus *il se douchait à 8h00*

"Il reflexive pronoun take-PER a shower at 8:00" versus

"Il reflexive pronoun take-IMP a shower at 8:00"

○ *se doucher : Elle s’est douchée à 8h00* versus *elle se douchait à 8h00*

"Elle reflexive pronoun take-PER a shower at 8:00" versus

"Elle reflexive pronoun take-IMP a shower at 8:00"

○ *se doucher : On s’est douché à 8h00* versus *on se douchait à 8h00*

"One reflexive pronoun take-PER a shower at 8:00" versus

"One reflexive pronoun take-IMP a shower at 8:00"

4. Verb *être* “to be” in conjunction with the first and second person singular (i.e., *j’* “contracted form of I”):

a. *être : J'ai été en Estonie* versus *j'étais en Estonie*

"I-contracted be-PER in Estonia" versus "I-contracted be-IMP in Estonia"

In addition to examining the appropriate discrimination of past tense marking and prototypical and non-prototypical marking, this test measured learners' reaction time with respect to their appropriate answers. The purpose of the reaction time feature was to provide an additional test to identify whether learners were faster at identifying appropriate answers with prototypical marking than with non-prototypical marking in cases where it is not easy to distinguish perfective from imperfective marking in the aural input; and whether the experimental treatment conditions could have an impact on the amount of time that learners require to process these forms.

4.6.1.3.1 Organization. The computerized test included 33 prompts divided into 24 target tokens and nine distractors, which were easy to discriminate. The test was based on an oral prompt that learners received from the computer. This prompt was delivered one second after a beep; the beep served to alert learners that a prompt sentence was coming. The prompt consisted of a sentence whose pronunciation is very close between prototypical (e.g., *je travaillais à la maison* "I work-IMP at home") and non-prototypical marking (e.g., *j'ai travaillé à la maison* "I work-PER at home").

A hidden timer, counting in milliseconds, was activated on the computer immediately at the end of the oral prompt and the learner was presented with the prototypical and non-prototypical versions of the target sentence. The learner had to click on the sentence that s/he thought was the one delivered through the aural prompt. The moment the learner clicked on the sentence, the timer stopped, the answer and the

time the learner required to provide the answer were saved onto a file and learners moved to the next prompt.

The distribution of the target sentences across prototypical and non-prototypical cases are displayed in Table 4.26. This table shows that the 24 prompts were divided into 12 sentences with prototypical marking and 12 sentences with non-prototypical marking. Distractors focussed on a sentence element such as the head noun, the direct object, or the article. For example, in *elle mange des fraises* “She eats strawberries,” the options presented to the learner were *elle mange des fraises* “She eats strawberries” and *elle mange des framboises* “She eats raspberries”.

Table 4.26

Perfective and Imperfective Markers with Verbal Predicates in the Listening Test

Type of verbal predicate	Perfective	Imperfective
Statives	3	3
Activities	3	3
Accomplishments	3	3
Achievements	3	3
Total	12	12

Note: Numbers in shaded areas indicate non-prototypical marking cases; numbers in non-shaded areas present prototypical-marking cases.

Both test versions were identical in number and type of verbal predicates and the combinations of verbal predicates with tense-aspect markers. Verbal predicates were in the same order. The test was piloted with 10 French native speakers. The following

extracts illustrate versions A and B of the test (See Figures 4.19 and 4.20 in Appendix B2 for screen samples of each test version).

Prompts presented in Example 4.5 illustrate that learners from both test versions were exposed to the same atelic verbal predicate of type stative: “to live in Paris” in version A and ‘to live near someone's house’ in version B. In both versions, the prompt was delivered orally with perfective morphology, making this use of past tense non-prototypical. Learners in both test versions were then presented with the prototypical and non-prototypical forms of the verbal predicate.

Example 4.5

Listening preference task

Version A

Prompt: *Elle a habité à Paris*

Sentences to select from:

Elle habitait à Paris

Elle a habité à Paris

Version B

Prompt: *Il a habité près de chez moi*

Sentences to select from:

Il habitait près de chez moi

Il a habité près de chez moi

4.6.1.3.2 Administration. This test was administered immediately after the situational task, when learners were already working with their corresponding test versions at their computer stations. Instructions and a series of four example prompts followed the initialization of the test. Sentences as those explained as distractors constituted the examples. Learners had the opportunity to repeat the example section once. Words in the prompt sentences were within the 1000 word range in the lexical profiler and were French level I vocabulary.

4.6.2 Treatment and Classroom Reports

Treatment and classroom reports included a series of questionnaires and teacher and classroom observation reports collected throughout the implementation of the research. The purpose of these instruments was to identify variables external to the characteristics of the environment that could impact the effectiveness of multimedia instruction, such as learners' and teachers' attitudes towards the lessons (i.e., technology, lesson topics, form-focussed procedures), learners' use of the multimedia tasks and teachers' attention to perfective and imperfective during their regular teaching.

4.6.2.1 Student Background Questionnaire

This questionnaire was administered to collect data about the participants' demographics, previous language learning experience and current French study habits. This questionnaire was administered in Spanish prior to the beginning of the experiment (see Appendix B3 for the Spanish version of the questionnaire).

Questions were presented in two sections: "I. Biodata" and "II. Language Learning Background." Section I included eight open-ended questions and elicited general information about the learner, such as gender, age, occupation and current

academic level. Section II included five multiple-choice questions and three open-ended questions. Multiple-choice questions focussed on the number of languages that learners spoke, places where they had and were attending French classes, and number of study hours and study activities outside the classroom. Learners could select as many answer choices as needed. Open-ended questions elicited information about the languages that learners spoke, countries where they had learned French and time spent there living or studying.

4.6.2.2 Lesson Logs

The environment generated a file (i.e., a log) containing information on learners' use of the environment during the lesson. A total of four logs were collected from each participant. Logs were generated in a folder on the computer station where learners worked. At the end of each multimedia lesson, the log was automatically transmitted through a server located at Arizona State University to an email database created at www.gmail.com.

Logs included the name of the learner, the experimental learning condition, lesson number and information on the lesson sections that learners completed, completion time, and in general, learners' answers to all questions and tasks.

4.6.2.3 Lesson Questionnaires

At the end of each multimedia lesson, the environment presented learners with a questionnaire adapted from questionnaires administered in previous studies (Borrás & Lafayette, 1994; Lyster, 2005; White, 1996); these questions elicited information about learners' attitudes towards the use of technology, the lesson, and its form-focussed procedures.

Specifically, six aspects of learners' attitudes towards the multimedia instruction were addressed through seven questions: (a) interest in the lesson and use of technology (Questions 1 and 2); (b) interest in the lesson multimedia task whereby past tense instruction was delivered (Question 3); (c) degree of lexical difficulty in the past tense task (Question 4); (d) past tense processing in the multimedia task (Question 5) attention to feedback (Question 6); and (e) the L2 aspects that the learner had benefited from the lesson (Question 7).

All questionnaires were administered in the form of multiple-choice in Spanish (see Appendix B3 for a sample questionnaire). For each question, learners received five possible choices, out of which they could select only one. Next to each choice, learners had a radio button. Once they highlighted the radio button indicating their answer, learners clicked on a push button to submit their answers and the next question appeared.

The same questions were administered for all lessons and in the same order. The consistency of the questions across lessons permitted the elicitation of between-lesson comparable data. It should be noted, however, that the questions were adjusted to the nature of the form-focussed task and its feedback type. For instance, Lesson 1 was constructed upon an interactive scrambled sentence task, whereas Lesson 2 was built upon the reconstruction of an oral text. Therefore, Question 2 in Lesson 1 one was: "Overall, learning in this computerized environment that combines images, interactive sentences, coloured texts, etc., was: a) very interesting, b) interesting, c) not interesting, d) boring, and e) very boring." Question 2 in Lesson 2 was: "Practicing French writing through the aural text reconstruction task was: a) very interesting, b) interesting, c) not interesting, d) boring, and e) very boring."

4.6.2.4 Input Enhancement Questionnaire

Upon completion of the delayed post-test, the researcher visited all classes to acknowledge their participation in the project and to discuss with learners their experience with the multimedia lessons. During the discussion, the researcher asked students three questions about the input enhancement feature in the environment using the input enhancement questionnaire developed by White (1998). The questionnaire is included in Appendix B3. Questions focussed on learners' perceptions, attitudes, and attention to the input enhancement feature present in the environment.

This questionnaire was administered after the delayed post-test, to avoid directing learners' attention to this form-focussed procedure during the experiment and thereby biasing the effects of the environment's features. Initially, the questionnaire was going to be administered in written form, to be able to quantify learners' answers. Participating teachers advised, however, that the input enhancement questions be delivered orally during the thank-you visit instead. The researcher made notes on key issues that had been covered during this final classroom visit, immediately after leaving the classroom.

4.6.2.5 Teacher Weekly Reports

From the time of the pre-test and to that of the delayed post-test, teachers completed a report sheet per week. On a day-by-day basis, teachers indicated in these sheets the topic discussed in class, the grammatical forms around which the lesson was built, and the materials they required. Teachers were also provided with extra sheets to add further comments related to the development of the class and which they considered could contribute to the project. For each participating class, teachers received a booklet that included eight dated report sheets covering a total of 40 hours of instruction.

4.6.2.6 Classroom Observations

During the implementation of the project, the researcher visited each participating class four times and completed a classroom observation sheet created following the Communicative Orientation of Language Teaching (COLT) observation scheme developed by Spada and Fröhlich (1995) (see Appendix B4).

In the observation sheet, the unfolding of the class was recorded, focussing on the nature of the tasks (e.g., reading, writing, peer work, grammar presentation, etc.). In particular, attention was paid to classroom tasks that could lead teachers or students to incidentally focus on the use of perfective and imperfective. The observation sheet was then used to identify whether this focus was teacher or student initiated, whether the focus was on the morphology or functional values of these forms, the manner in which the teacher addressed the issue (i.e., explanations or examples), the amount of explanation provided (i.e., none, minimal, extended), number of examples and example mode (i.e., written on the board or orally).

4.7 Study Timeline

The study was conducted over the ten weeks of the Autumn of 2006 from August 28 to November 4. A weekly summary of activities is now provided. Figure 4.21 illustrates the administration of the tests and the multimedia treatment lessons.

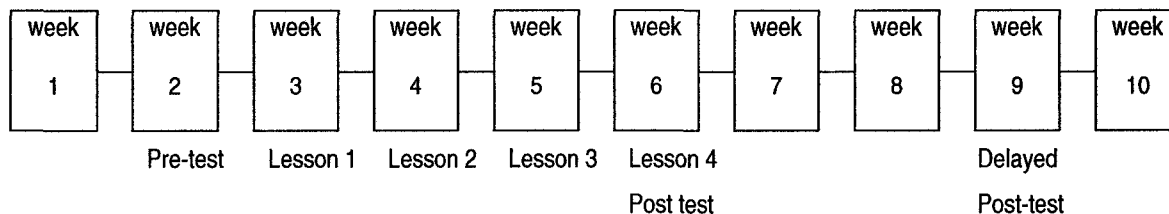


Figure 4.21 Lesson and test administration

Week 1: Teacher Training (August 28 to September 1) During this week, information about the purpose and implementation of the project was provided to participating teachers during a 10-hour workshop.¹⁴ Teachers received a booklet containing a description of activities per week and their teacher-report sheets.

Week 2: Invitation & Written Pre-test (September 4 - 8) This was the first actual week of classes. The researcher visited the participating French classes and explained that all classes from levels III to VI were participating in an innovative project of the Language Centre exploring the integration of computers into the regular curricula of the French department, to provide learners with technology-based opportunities that would help them improve their reading, listening, and writing skills. No mention was made that the focus of the study was on the perfective and imperfective. Consent forms and student linguistic background questionnaires were distributed and the first classroom observation was conducted. Teachers completed the week-1 report. On Friday teachers administered the Cloze Task, as a pre-test.

Week 3: Computerized Pre-test & Lesson 1 (September 11 -15) On Monday four of the participating classes were administered both computer tests. The other classes were pre-tested on Tuesday. Classes were separated to avoid timetable conflicts with respect to access to the computer room. Lesson 1 was administered to half of the classes on Tuesday and to the other half on Friday. Upon completion of Lesson 1, participants answered the Lesson 1 Questionnaire. Teachers completed report 2.

¹⁴ The authorities of the Language Centre set aside 10 hours for the French department teachers to attend this information session as part of their regular summer teacher development workshops.

Week 4: Lesson 2 (September 18 -22) Half the classes completed Lesson 2 and its corresponding Questionnaire on Tuesday; the other classes did so on Wednesday. Teachers completed their week-3 reports and classes were observed for the second time.

Week 5: Lesson 3 (September 25 -29) Lesson and Questionnaire number 3 were administered following the format of Lesson 2. Teachers completed their week-4 reports and Classroom Observation 3 was conducted.

Week 6: Lesson 4 & Immediate Post-test (October 2 to October 6) Half the classes received Lesson and Questionnaire 4 on Monday. These classes completed the computerized immediate post-tests at the computer lab on Tuesday and teachers administered the immediate post-test Cloze Task to these classes on Wednesday. The rest of the classes received Lesson and Attitude Questionnaire 4 on Wednesday and received the computerized tests on Tuesday. They received the cloze task on Friday. Teachers completed the week-5 report.

Weeks 7 and 8 (October 9 to October 21) Teachers completed week-6 and 7 reports. Classroom observation 4 was conducted during week 8.

Weeks 9: Delayed Post-test (October 23 to 28) Half of the classes received the situational task and the listening tests in the computer lab on Tuesday and teachers administered the cloze task the following day in their classrooms. The second half of the classes received the computer tests on Wednesday, and the cloze tasks of Thursday. Teachers completed the week-8 report.

Week 10: Results & Input Enhancement Questionnaire (October 30 to November 4)
The researcher visited the participating classes to acknowledge their participation in the

project, administered the Input Enhancement Questionnaire, and distributed thank-you letters in which learners received their test scores.

4.8 Chapter Summary

This chapter outlined the learning context in which the study was conducted and the experimental multimedia learning conditions that were implemented. The tests and treatment and classroom reports that were designed and administered over the ten-week period of the experiment to capture these effects were also described. The analyses conducted on the data that were collected through these instruments and the results that obtained are presented in the following chapter.

CHAPTER 5

ANALYSES & PRESENTATION OF RESULTS

In this chapter, the analyses of the data collected through the various instruments and their corresponding results are reported. The interpretation of the data is reserved for Chapter 6. Chapter 5 is divided into three main sections.

Section 5.1 presents the results of analyses of variance conducted on learners' past tense use data collected prior to, immediately after, and three weeks after the treatment through the Cloze Task, the situational task and the listening tests. These results are reported in four subsections. Subsection 5.1.1 presents the scoring procedures and models for statistical analyses used with each test's data. Subsection 5.1.2 reports the results from one-way ANOVA conducted on test versions at pre-test time. Subsection 5.1.3 then presents the results of analyses of variance of learners' scores at pre-test time to identify their use of past tense prior to the multimedia treatment. These data constitute the baseline for subsequent analyses. Subsection 5.1.4 reports learners' scores at the three testing times and ANOVAs used to examine the effects of multimedia instruction on past tense score changes over time.

Section 5.2 presents data collected through treatment and classroom reports: Lesson Logs, learners' answers to Lesson and Input Enhancement Questionnaires, Class Observations and teachers' Weekly Reports. Data are reported in two subsections. Subsection 5.2.1 reports data with respect to learners' attention to the multimedia lessons, using data from Lesson Logs and Lesson and Input Enhancement Questionnaires. Subsection 5.2.2 reports data from Classroom Observations and teachers' Weekly Reports, to examine attention to past tense during regular classroom time.

Finally, Section 5.3 revisits the hypothesis of the study, drawing on the results of the data collection instruments.

5.1 Past Tense Test Results

This first section of Chapter 5 focuses on the learners' past tense use across testing times. First, the scoring procedures and models for statistical analyses of the participants' past tense scores are presented. Then, the results of the statistical analyses are presented in three subsections: analyses of pre-test scores by test versions, analyses of participants' past tense use prior to the treatment and analyses of the evolution of participants' past tense scores throughout the experiment.

5.1.1 Scoring Procedures and Models for Analyses

Learners' answers in the cloze task, situational task, listening test and time reaction were coded for (a) overall appropriate use, (b) appropriate perfective and imperfective and (c) appropriate use of past tense in prototypical and non-prototypical contexts. Due to differences in the number of target items across tests, the number of appropriate answers in the cloze task, situational task and listening test were converted to percentages. Learners' reaction times were analyzed in milliseconds. The scores that learners obtained in each instrument were analyzed using different analyses of variance. The following two sections describe the scoring procedures and the models for the analyses of variance.

5.1.1.1 Scoring Procedures

Learners' appropriate answers in each test were scored three times, in order to obtain (a) an overall score for the appropriate use of past tense in the test, (b) scores for

the appropriate use of perfective and imperfective markers, and (c) scores for the appropriate use of prototypical and non-prototypical past.

Appropriate use refers to a recognizable attempt at the required grammatical aspect for the context. Accurate use focuses on the well formedness of the perfective and imperfective forms, with respect to choice of the auxiliary, gender, and number agreements. The perfective in the sentence **Hier je suis acheté une voiture* is appropriate, but it is not accurate due to the use of *être* instead of *avoir* (for further discussion of appropriate vs. accurate use see Bardovi-Harlig & Bergström, 1996; Bardovi-Harlig, 2000). Since this study focussed on the impact of instruction on the appropriate recognition of perfective and imperfective contexts and not on the well-formedness of past tense, all the reports that follow present results in appropriate use of past tense only. The sections below describe the scoring procedures that were used with each testing instrument.

5.1.1.1.1 Cloze task scoring. Learners' answers in this test were marked first for the overall appropriate use of past tense, then for perfective and imperfective and finally for the appropriate use of prototypical and non-prototypical marking separately. In Example 5.1, for instance, the learner was prompted for the use of past tense in three different contexts¹⁵. Item 1 (*monter* “to climb”) was in an obligatory context for the use of imperfective, but the learner supplied perfective. Item 2 (*dormir* “to sleep”) was in an obligatory context for the use of perfective, which the learner appropriately identified.

¹⁵ The numbers provided in the parenthesis in the example are to help the reader identify the tokens; these numbers did not appear in the tests that learners received.

Item 3 (*sentir* “to feel”) was in an obligatory context for imperfective, which the learner supplied accordingly.

With respect to the overall appropriate use of past tense marking, this learner scored two points as perfective and imperfective were supplied in their corresponding obligatory contexts (Item 2 and Item 3). For appropriate perfective and imperfective use, this learner scored one point in the appropriate use of perfective, as its use was appropriate with Item 2 only, and one point in the appropriate use of imperfective, as the use of imperfective was appropriate with Item 3.

For the appropriate use of prototypical and non-prototypical marking, this learner scored one point for non-prototypical marking, as the learner appropriately identified an obligatory context for the use of the perfective with an atelic predicate (i.e., Item 2: *dormir*); the learner also scored one point for prototypical marking, as imperfective was supplied in its obligatory context with an atelic predicate (i.e., Item 3: *se sentir*).

Example 5.1

Learner's Use of Past Tense in the Cloze Task

Mes amis et moi avons suivi un entraînement intensif pour nous préparer à escalader le mont Everest. Malgré cet entraînement, l'année passée, pendant que je (1.- monter) j'ai monté le mont Everest, soudainement mon corps et ma tête ont semblé ne plus répondre. J'ai demandé à mes amis d'arrêter pour me reposer un peu. Je (2.- dormir) j'ai dormi, puis mes amis m'ont dit qu'ils voulaient continuer la marche jusqu'au coucher du soleil. Mais moi, je (3.- se sentir) je me sentais très fatigué.

The maximum score that a learner could achieve for overall appropriate past tense use in this test was 50; the maximum score that a learner could achieve for appropriate use of perfective or imperfective was 25 respectively. Also, the maximum score that learners could obtain for either appropriate prototypical or non-prototypical marking was 25 respectively. Due to differences in the number of tokens between telic ($n = 10$) and atelic ($n = 15$) tokens in the tests, learners' scores were turned into percentages for each combination of grammatical aspect and verbal category (i.e., perfective-statives, perfective-activities, perfective-accomplishments, perfective-achievements, imperfective-statives, imperfective-activities, imperfective-accomplishments, imperfective achievements). To obtain the imperfective score, the four categories that included perfective were added up and an average was obtained. This procedure was followed to maintain homogeneity of measurement across categories and be able to run analyses of variance on the data (for further details on this scoring procedure, see Izquierdo & Collins, in press).

5.1.1.1.2 Situational task scoring. Learners' answers in this test were also marked first for the overall appropriate use of past tense, then for appropriate perfective and imperfective choice, and finally for appropriate use of prototypical and non-prototypical marking. In order to score a point, the learner needed to identify the sentence that was true and the sentence that was false with respect to the situation.

Example 5.2 will serve to illustrate the scoring procedure. In Situation 1, the sentence in perfective is true with respect to the context; the sentence in imperfective is false. In Situation 2, the perfective sentence is false and the sentence with imperfective is

true. Since the learner marked these sentences as such, this learner scored 2 points with respect to the overall appropriate use of past tense marking.

With respect to the appropriate use of each grammatical aspect, situations were identified as perfective or imperfective depending on the grammatical aspect used in the sentence that was true. In Example 5.2, for instance, Situation 1 the perfective sentence was true and the imperfective sentence was false. Learners who identified these sentences as true and false respectively scored a point for perfective. In Situation 2 the perfective sentence is false, and the imperfective sentence is true. In this case, learners who correctly identified these sentences scored one point for imperfective.

Example 5.2

Learner's Answers in the Situational Task

Situation 1

Luc fait partie d'une équipe de soccer. Un jour, il est fatigué; il se rend à la partie, mais il ne joue pas. Sa mère pense qu'il participe au match. Le lendemain, sa sœur lui dit la vérité.

V F *Sa mère a su la vérité*

V F *Sa mère savait la vérité*

Situation 2

Julia fait la cuisine tous les soirs pendant que sa sœur Rosanna regarde la télévision. Ce soir, il y a des invités alors Rosanna fait la cuisine avec Julia.

V F *Rosanna n'a pas aidé Julia*

V F *Rosanna n'aidait pas Julia*

For the appropriate use of prototypical and non-prototypical marking, the learner scored one point for non-prototypical marking, as in Situation 1 where the learner was able to determine that the use of perfective was appropriate with an atelic predicate (i.e., *savoir la vérité* “to know the truth”) and the use of imperfective with the same predicate was not correct. With respect to prototypical marking, the learner scored one point for Situation 2, by identifying that the use of imperfective was appropriate with an atelic predicate (*ne pas aider Julia* “not to help Julia”), whereas the use of perfective was not.

The maximum score that a learner could achieve for past tense marking in this test was 24; the maximum score that a learner could achieve for perfective, imperfective, prototypical or non-prototypical marking was 12. Scores were then converted to percentages.

5.1.1.1.3 Listening test scoring. In this test, learners scored one point for each past tense sentence that they appropriately identified from the aural input. The total number of correct answers provided by the learner constituted the score for the overall appropriate use of past tense marking. The number of perfective and imperfective sentences that learners correctly identified constituted their respective perfective and imperfective scores. The same applied for appropriate prototypical and non-prototypical use. The maximal score that learners could attain for past tense marking was 24; the maximal score that learners could attain for perfective, imperfective, prototypical or non-prototypical marking was 12. Results are reported in percentages.

5.1.1.1.4 Reaction time measurement. The time that participants required to supply a correct answer with each of the listening prompts was saved independently, during the administration of the computerized test.

For each learner, reaction time averages were obtained for each of the eight combinations between grammatical aspect and verb type: (a) perfective-stative, (b) perfective-activities, (c) perfective-accomplishments, (d) perfective-achievement, (e) imperfective-stative, (f) imperfective-activity, (g) imperfective-accomplishment and (h) imperfective achievement. Reaction times were calculated for correct answers only and all participants obtained at least one correct response within each of the eight combinations.

To obtain the average of each combination, the reaction times of all of the appropriate answers in the combination were added up and the resulting time was divided by the number of appropriate answers that had contributed to the addition.

Since the computer program did not time learners' answer provision, a reaction time range was needed, to make reaction times comparable between participants and experimental groups. Hence, at each testing time, learners' reaction times were pooled for each grammatical aspect-verb type combination and a grand mean and a standard deviation (SD) were obtained.

Then, each learner's reaction time for the combination in focus was examined, to determine that it be between the -2 SDs and $+2$ SDs range. Timed reactions that were below -2 SDs were excluded and a -2 SD reaction time was assigned to the learner instead. Similarly, reaction times above $+2$ SDs were substituted using $+2$ SD time reaction.

To obtain the overall past tense reaction time of a learner, the reaction time of the eight combinations were added up and then divided by eight. To obtain each learner's perfective reaction time average, the reaction times obtained for the four combinations

with perfective were added up and averaged. The same procedures were used to obtain each learner's imperfective, prototypical and non-prototypical reaction times.

5.1.1.2 Models for Analyses of Past Tense Scores

Three distinct analyses of variance were used to examine all the data that were collected from the past tense tests across testing times: one-way, two-way, and mixed design. Data from each instrument were analyzed separately.

At pre-test time, one-way ANOVA was used to identify significant differences between test version scores (i.e., Version A and Version B). Two-way ANOVA was used to determine score differences resulting from the effects of developmental conditions and multimedia environments (i.e., main and interaction effects of these two variables). Finally, mixed design (between and within group) ANOVA was used to identify score differences that resulted from the effects of (a) developmental condition, multimedia environments and grammatical aspect (i.e., perfective and imperfective) and (b) developmental condition, multimedia environments and past tense type (i.e., prototypical and non-prototypical).

Scores that learners obtained over time were analyzed using mixed design analyses of variance. This ANOVA type was used to determine score differences resulting from the effects of (a) developmental condition, multimedia environments and testing time; (b) developmental condition, multimedia environments, testing time and grammatical aspect (i.e., perfective and imperfective) and (c) developmental condition, multimedia environments, testing time and past tense type (i.e., prototypical and non-prototypical).

Data were analyzed using the Repeated Measure ANOVA option available through the General Linear Model analyses of SPSS version 11. Only significant main and interaction effects are reported. In the chapter, only tables of means and figures for significant interactions are presented unless otherwise indicated. Tables of means for four way interactions that were not significant are included in the Appendix Section.

The alpha level was set at .05. In other words, main and interaction effects were considered to be significant when they obtained a probability of $p < .05$. To avoid Type I Errors, the Bonferroni method for multiple pairwise comparisons was chosen in SPSS for post-hoc analyses when a significant main effect or interaction was found in the analyses of variance since the Bonferroni method incorporates an adjustment to the probability level based on the number of pairwise comparisons conducted. For further details on this type of statistical procedures, see Fields (2005, pp. 465-472). Using Bonferroni adjustments in the post-hoc tests, pairwise comparisons were significant when a $p < .008$ ¹⁶ obtained. Tables for pairwise comparisons including mean differences and standard errors are included in the appendices with the ANOVA tables of the corresponding mean and interaction effects.

Effect size is reported as Hedges' d , which was calculated as the difference between the two group means divided by the pooled within-group variance of the two groups, whose result was then multiplied by an adjustment factor for small samples: $1 - (3/(4N-9))$ (Hedges & Olkin, 1985, p. 81). Hedges' d was calculated, rather than Cohen's d , due to the small number of participants in each experimental condition. Cohen's

¹⁶ This adjusted alpha for pairwise comparisons resulted from dividing .05 by the total number of mean contrasts within the significant main or interaction effect. In most cases the total number of mean contrasts was six.

(1988) interpretation of effect sizes was used to determine whether they were "small, $d = .2$," "medium, $d = .5$," or "large, $d = .8$ ". Effect sizes are reported for significant pairwise comparisons.

5.1.2 Test Version Analyses

Chapter 4 outlined that two versions of each instrument were administered at the pre-test time: A ($n = 30$) and B ($n = 24$). To identify significant differences between test versions with each instrument, separate one-way analyses of variance were conducted on participants' pre-test scores. Table 5.1 displays the mean scores, reaction times, and standard deviations for the two versions of each of the three tasks.

Table 5.1

Past Tense Scores at Pre-test per Test Version

Test		Situational							
Version	n	Cloze Task		Task		Listening Task		Reaction Time	
		M	SD	M	SD	M	SD	M	SD
A	30	69.5%	12.8	75%	19.6	52.9%	9.4	459	126
B	24	66%	17.2	75%	21.6	52.9%	10.24	439	118

The analyses of variance revealed no significant differences between test versions for scores on the cloze task, $F(1,52) = .75$, $p = .39$, the situational task, $F(1,52) = .01$, $p = 1$, or the listening task $F(1,52) = 1$, $p = .39$. There were also no differences in reaction times, $F(1,52) = .35$, $p = .56$ (see Tables 5.2 – 5.5 in Appendix G for ANOVA tables). Since no significant differences were found between test versions, the scores from test versions were combined for data analyses.

5.1.3 Baseline Data (Pre-test Results)

Two different types of ANOVAs were performed on the pre-test data: two-way, to identify significant differences in past tense resulting from the interaction between developmental condition and learning environment; and mixed design, to identify significant differences between (a) perfective and imperfective and (b) prototypical and non-prototypical past, within and between experimental groups. A summary of pre-test findings from all four instruments is provided at the end of Section 5.1.3.

5.1.3.1 Cloze Task Results

Pre-test scores in the cloze task were analyzed separately for appropriate (a) past tense use, (b) perfective and imperfective marking and (c) prototypical and non-prototypical past. The results are presented in this order.

5.1.3.1.1 Overall past tense. Chapter 4 indicated that appropriate past tense use scores in the cloze task were used to group participants into one of two developmental conditions: RD (i.e., ready) or NR (i.e., non-ready) for non-prototypical past tense. Learners from both developmental conditions were then assigned to one of two multimedia learning environments: E1 (i.e., prototypical past instruction) or E2 (i.e., non-prototypical past instruction). This assignment led to four experimental L2 multimedia-learning conditions: E1-NR, E1-RD, E2-NR and E2-RD.

Two-way analyses of variance were conducted to examine past tense score differences between (a) developmental conditions, (b) learning environments and (c) experimental groups (see Table 5.6 in Appendix G, for the ANOVA table).

The main effect for developmental condition was found to be significant, $F(1,50) = 148.5, p < .01$, with no score distribution overlap, $d = 3.35$. RD participants ($n = 29, M$

= 79.8%, $SD = 6.4$) were better able to use past tense than their NR counterparts ($n = 25$, $M = 54.2\%$, $SD = 8.6$) in the cloze task.

The main effect for learning environment was not significant $F(1,50) = .11$, $p = .74$. In other words, learners in E1 ($n = 24$, $M = 67.4\%$, $SD = 15.9$) and E2 ($n = 30$, $M = 68.4\%$, $SD = 14.2$) exhibited similar past tense scores in the cloze task prior to the treatment.

The interaction effect between developmental condition and learning environment yielded no statistical significance, $F(1,50) = .06$, $p = .81$. Table 5.7 shows minuscule mean differences between RD learners assigned to E1 and E2 and between RD learners assigned to E1 and E2, but large mean differences between developmental conditions.

Table 5.7

Experimental Groups' Past Tense Scores in the Cloze Task at Pre-test

Experimental Condition	n	Mean	SD
E1-NR	12	54.3%	10.8
E1-RD	12	80.5%	6.7
E2-NR	13	54.2%	6.5
E2-RD	17	79.3%	6.4

5.1.3.1.2 Perfective and imperfective scores. To identify differences in the appropriate use of grammatical aspect (i.e., perfective and imperfective) within and between experimental conditions, mixed-design analyses of variance were used (between: developmental condition and environment; within: grammatical aspect). The ANOVA table is presented in Appendix G as Table 5.8. The analyses revealed a main effect for

grammatical aspect, $F(1,50) = 17.63, p < .01$, with a large effect size, $d = 1.32$. Learners exhibited better use of perfective ($n = 54, M = 83.9\%, SD = 10.5$) than imperfective ($n = 54, M = 55.6\%, SD = 28.4$) in the cloze task. No significant interaction was found between grammatical aspect and multimedia environment, $F(1,50) = 3.22, p = .08$.

Table 5.9

Developmental Groups' Perfective and Imperfective Means in the Cloze Task at Pre-test

Developmental Condition	<i>n</i>	Grammatical Aspect	
		Perfective	Imperfective
NR	25	80.6%	30.8%
		(13.2)	(20.2)
RD	29	86.8%	76.9%
		(6.3)	(12.4)

Note: Standard deviations are presented in parentheses

The analyses of variance revealed a significant interaction effect between grammatical aspect and developmental condition, $F(1,50) = 42.96, p < .01$. For tables of pairwise comparisons, see Tables 5.8 A and B in Appendix G. Table 5.9 above displays developmental groups' cloze task perfective and imperfective means at pre-test.

Post-hoc tests using the Bonferroni adjustments for pairwise comparisons for the interaction effect between grammatical aspect and developmental condition indicated that NR learners were better able to identify perfective than imperfective contexts ($p < .001, d = 2.92$). In comparison to the adjusted alpha, the pairwise comparison between perfective and imperfective within the RD participants proved not to be significant (p

= .03). Pairwise comparisons revealed that RD participants were better able to use imperfective than their NR counterparts ($p < .001$, $d = 2.92$). With respect to perfective, the post-hoc pairwise comparisons indicated that the difference between developmental groups was not significant ($p = .03$). These patterns of interaction between grammatical aspect and developmental condition prevailed during the assignment of RD and NR participants to both learning environments, as the interaction effect between developmental condition, learning environment and grammatical aspect was not significant, $F(1,50) = .24$, $p = .63$. Table 5.10 in Appendix H displays groups' means for this interaction effect.

5.1.3.1.3 Prototypical and non-prototypical scores. Pre-test cloze task scores were also analyzed for past tense type (i.e., prototypical and non-prototypical), using mixed design analyses of variance (between: developmental condition and learning environment; within: past tense type). The ANOVA table is presented in Appendix G as Table 5.11.

Analyses of variance yielded a significant effect for past tense type, $F(1,50) = 14.14$, $p < .001$, with a small effect size, $d = .45$. Participants did better in prototypical ($n = 54$, $M = 71.8\%$, $SD = 17.8$) than non-prototypical contexts ($n = 54$, $M = 64.2\%$, $SD = 16$). The interaction between developmental condition and past type was not significant, $F(1,50) = 2.14$, $p < .150$. Means for this interaction are displayed in Table 5.12 in Appendix H, showing that better use of past tense in prototypical contexts prevailed within developmental groups.

Table 5.13

E1 and E2 Groups' Cloze Task Prototypical and Non-prototypical Means at Pre-test

Environment	<i>n</i>	Past Type	
		Prototypical	Non-Prototypical
E1	24	73.8%	61%
		(18.5)	(16.5)
E2	30	70.1%	66.7%
		(17.4)	(15.5)

Note: Standard deviations are provided in parentheses

The interaction between past tense type and learning environment proved to be significant however, $F(1,50) = 4.98$, $p = .03$. Means are displayed in Table 5.13. Tables 5.11 A and B in Appendix G display standard errors, mean differences and pairwise comparison probabilities. Bonferroni pairwise mean comparison tests revealed that learners assigned to E1 did significantly better with prototypical than non-prototypical past ($p = .001$), with medium effect size, $d = .72$. Within the E2 group, the pairwise comparisons indicated that the mean difference between prototypical and non-prototypical past was not significant ($p = .26$). Pairwise mean comparisons between groups did not reveal significant differences in prototypical ($p = .07$) and non-prototypical past ($p = .19$).

The interaction between developmental condition, learning environment and past tense type yielded no statistical significance, $F(1,50) = .63$, $p = .43$. Table 5.14 in Appendix H displays group means for the interaction of these three variables.

5.1.3.2 Situational Task

Scores in the situational task were examined for appropriate (a) past tense use, (b) perfective and imperfective use and (c) prototypical and non-prototypical past. Separate ANOVAs were conducted.

5.1.3.2.1 Overall past tense scores. Two-way analyses of variance were used to identify past tense score differences between (a) developmental conditions, (b) learning environments and (c) experimental groups at pre-test time. The ANOVA table is presented in Appendix G as Table 5.15.

Analyses of past tense scores revealed a significant main effect for developmental condition, $F(1,50) = 14.12, p < .01$, with a large effect size, $d = 1.03$. RD participants ($n = 29, M = 83.8\%, SD = 10.8$) scored significantly higher than NR ones ($n = 25, M = 64.8\%, SD = 23.9$). The main effect multimedia environment was not significant, $F(1,50) = .87, p = .36$.

Table 5.16

Experimental Groups' Past Tense Means in the Situational Task at Pre-test

Experimental Group	<i>n</i>	Mean	SD
E1-NR	12	69.44%	21.7
E1-RD	12	84.03%	7.1
E2-NR	13	68.58%	25.9
E2-RD	17	83.58%	13.1

Table 5.16 shows the mean scores for the two experimental conditions for the NR and RD groups. The interaction between environment and developmental condition proved not to be significant, $F(1,50) = .71$, $p = .40$. Thus, there was no difference between NR learners assigned to E1 and E2, or between RD learners assigned to E1 or E2.

5.1.3.2.2 Perfective and imperfective scores. Participants' answers in the situational task were further analyzed by grammatical aspect, to examine differences between appropriate perfective and imperfective scores, using mixed design ANOVA (between: developmental condition, learning environment; within: grammatical aspect). The ANOVA table is presented in Appendix G as Table 5.17.

ANOVAs did not yield a significant effect for grammatical aspect, $F(1,50) = .28$, $p = .60$. Nor did the analyses reveal an interaction between grammatical aspect and (a) developmental condition, $F(1,50) = .20$, $p = .66$; (b) learning environment, $F(1,50) < .01$, $p = 1$; and (c) developmental condition and learning environment, $F(1,50) = 1.32$, $p = .26$. For a table of means of this interaction effect, see Table 5.18 in Appendix H.

5.1.3.2.3 Prototypical and non-prototypical scores. Past tense scores in the situational task were analyzed by past tense type (i.e., prototypical and non-prototypical), using mixed-design ANOVA (between: developmental condition, learning environment; within: past type). The ANOVA table is presented in Appendix G as Table 5.19.

ANOVAs did not yield statistical significance for the main effect past type $F(1,50) = 2.43$, $p = .13$. Neither did the results yield a significant interaction between past type and the other variables: (a) developmental condition, $F(1,50) = 3.93$, $p = .053$; (b) environment, $F(1,50) = .72$, $p = .40$; and (c) developmental condition and environment,

$F(1,50) = .90, p = .35$. Means for the interaction between developmental condition, environment and past type are presented in Table 5.20 in Appendix H.

5.1.3.3 Listening Task

Using the ANOVA procedures described previously, learners' appropriate answers in the listening task were also analyzed for appropriate past tense, perfective and imperfective, and prototypical and non-prototypical scores.

5.1.3.3.1 Overall past tense scores. Two-way ANOVA was used, to identify general score differences between the experimental groups (between: developmental group, learning environment). The ANOVA table is provided in Appendix G as Table 5.21. Results did not yield statistical significance for the main effects of learning environment, $F(1,50) = .26, p = .62$, or developmental condition, $F(1,50) = 1.08, p = .30$. The interaction between developmental condition and learning environment proved not to be significant either, $F(1,50) = .80, p = .38$. Table 5.22 in Appendix H displays similar means between and within experimental groups.

5.1.3.3.2 Perfective and imperfective scores. To examine the effect of grammatical aspect on learners' scores in the listening test, mixed design ANOVAs were conducted (between: developmental condition, learning environment; within: grammatical aspect). The ANOVA table is presented in Appendix G as Table 5.23.

ANOVA results yielded a significant main effect for grammatical aspect, $F(1,50) = 26.17, p < .01$, with large effect size, $d = 1.08$, as learners were better able to identify perfective ($n = 54, M = 61.4\%, SD = 16.7$) than imperfective ($n = 54, M = 44.4\%, SD = 14.4$) targets. The interaction between developmental condition, learning environment and grammatical aspect proved not to be significant, $F(1,50) = .57, p = .45$. Table 5.24

shows that all four experimental groups did better with perfective than imperfective targets.

Table 5.24

Experimental Groups' Perfective and Imperfective Means in the Listening Task at Pre-test

Experimental Groups	<i>n</i>	Grammatical Aspect	
		Perfective	Imperfective
E1-NR	12	63.9% (12.9)	45.8% (10.9)
E1-RD	12	64.6% (15.5)	43.1% (9.9)
E2-NR	13	58.9% (18.2)	40.4% (20.7)
E2-RD	17	59.3% (19.3)	47.6% (13.8)

Note: Standard deviations are provided in parentheses

5.1.3.3.3 Prototypical and non-prototypical scores. Past tense scores were further examined, to identify the effects of past tense type, using mixed design ANOVA (between: developmental condition, learning environment; within: past type). The ANOVA table is provided in Appendix G as Table 5.25.

Results revealed a significant effect for past tense type, $F(1,50) = 37.68$, $p < .01$, with a large effect size, $d = 1.27$. Overall, participants were better able to identify prototypical ($n = 54$, $M = 62.4\%$, $SD = 14.7$) than non-prototypical prompts ($n = 54$, $M =$

43.2%, $SD = 14.7$). The interaction between past type and developmental condition, $F(1,50) = 2.61$, $p = .11$, or multimedia environment, $F(1,50) = .66$, $p = .42$, did not prove to be significant. Neither did the interaction between past type, developmental condition and multimedia environment yield significance, $F(1,50) = .02$, $p = .89$. Table 5.26, illustrates that all experimental groups showed better scores with prototypical than non-prototypical prompts.

Table 5.26

Experimental Groups' Prototypical and Non-prototypical Means in the Listening Task at Pre-test

Experimental Group	<i>n</i>	Past Tense Type	
		Prototypical	Non-Prototypical
E1-NR	12	63.2%	46.5%
		(12.5)	(13.5)
E1-RD	12	66.7%	40.9%
		(14.7)	(14.4)
E2-NR	13	55.1%	44.2%
		(15.4)	(18.4)
E2-RD	17	64.2%	42.7%
		(14.9)	(13.5)

Standard deviations are provided in parentheses

5.1.3.4 Reaction Times

The time that learners spent providing an appropriate answer in the listening task was analyzed through a series of ANOVAs. These analyses compared reaction times (RTs) in learners' appropriate past tense responses, correct perfective and imperfective responses, and appropriate prototypical and non-prototypical responses.

5.1.3.4.1 Overall past tense scores. The time that learners spent on all their correct answers in the test was analyzed, to determine significant differences between experimental groups, using a two-way ANOVA procedure. The ANOVA table is presented in Appendix G in Table 5.27. The analyses did not reveal a significant main effect for developmental condition, $F(1,50) = .02, p = .89$, nor a significant effect for learning environment, $F(1,50) = .44, p = .51$. The interaction of these two variables did not yield significance either, $F(1,50) = .30, p = .58$. In Appendix H, Table 5.28 shows very similar RT means within and between experimental groups.

5.1.3.4.2 Perfective and imperfective scores. Mixed design analyses of variance (between: developmental condition, learning environment; within: grammatical aspect) were then conducted on reaction times (RTs) for the appropriate selection of perfective and imperfective sentences. The resulting ANOVA table is presented in Appendix G as table 5.29. The main effect of grammatical aspect was not significant, $F(1,50) = 2.48, p = .12$, nor was there an interaction with developmental condition, $F(1,50) = .82, p = .37$, or with learning environment, $F(1,50) = .02, p = .90$. The interaction between these three variables also yielded no statistical significance, $F(1,50) = .13, p = .72$. Means and standard deviations for the interaction of these variables are provided in Table 5.30 in Appendix H.

5.1.3.4.3 Prototypical and non-prototypical scores. RTs were also analyzed for past tense type, using mixed design analyses of variance (between: developmental condition, learning environment; within: past type). The ANOVA table is presented in Appendix G as Table 5.31.

Results revealed a significant difference for past tense type, $F(1,50) = 26.70$, $p < .01$, $d = .80$. Learners were faster at selecting appropriate answers in prototypical ($n = 54$, $M = 391$, $SD = 160$) than in non-prototypical contexts ($n = 54$, $M = 511$, $SD = 134$). No significance was found for the interaction between past type and developmental condition, $F(1,50) = .92$, $p = .34$, nor for the interaction between past type and learning environment, $F(1,50) = .09$, $p = .76$. The interaction between developmental condition, learning environment and past type was not significant either, $F(1,50) = .95$, $p = .34$. Table 3.32, presented in Appendix H, shows that all experimental groups were faster at selecting prototypical than non-prototypical appropriate answers.

5.1.3.5 Summary of Past Tense Use at Pre-test Time

There was no significant difference between test versions, indicating that the test version to which learners were exposed during the data collection process did not have an impact on the results that obtained. Consequently, the scores from the two test versions were combined for all analyses. Significant differences between developmental groups were identified in the production and written comprehension task. No significant differences were documented in the past tense tests between participants assigned to Environment E1 and E2 with the exception of the cloze task.

Written production (Cloze task) In line with the developmental group organization criteria, learners in the RD condition showed significantly better past tense use. Overall, all participants showed better use of perfective than imperfective; these patterns prevailed once participants were assigned to multimedia environment, as evidenced by the absence of interactions between developmental conditions, environment type and grammatical aspect. RD participants exhibited better use of prototypical and non-prototypical past in comparison to NR learners. The analyses of variance revealed, however, that during the assignment to the multimedia environments the significant preference for prototypical past prevailed only among RD learners assigned to Environment 1.

Written comprehension (Situational task) Overall, learners classified as developmentally ready did better than learners who were classified as non-ready. Neither RD nor NR learners exhibited better scores between tense-aspect markers or between tense-aspect marking types (i.e., prototypical vs. non-prototypical marking).

Listening comprehension (Listening task) No significant differences in the appropriate identification of tense-aspect marking were found between groups. However, learners exhibited better identification of (i) perfective than imperfective and (ii) prototypical than non-prototypical prompts.

Reaction times (Time measurement for appropriate answers in the listening preference task) There was no significant difference in RTs for the appropriate identification of tense-aspect marking. However, there was a significant difference in RTs with proto-typicality: learners were faster at correctly identifying prototypical targets than they were at identifying non-proto-typical targets.

5.1.4 Treatment Effects

This section presents the results of mixed design analyses of variance, which were used to identify the effects of the multimedia learning conditions on changes in (a) past tense scores, (b) appropriate perfective and imperfective use and (c) appropriate prototypical and non-prototypical marking, as documented through the four testing instruments. Results from each instrument are presented separately. A summary of findings in past tense changes over time from all instruments is presented at the end of Section 5.1.4.

5.1.4.1 Cloze Task Score Changes

The scores that learners obtained in the cloze task prior to, immediately after, and three weeks after the multimedia treatment were compared to identify significant changes in past tense test scores, grammatical aspect and past tense type.

5.1.4.1.1 Overall past tense. Mixed design analyses of variance were used to examine score changes over time within and between experimental groups (between: developmental condition, learning environment; within: testing time). For the ANOVA table, see Table 5.33 in Appendix I.

ANOVA results revealed a significant main effect for testing time, $F(2,100) = 50.73$ $p < .01$ (for a table of pairwise comparisons see Table 5.33 A in Appendix I). The means for each testing time are displayed in the bottom row of Table 5.34 on the next page. Bonferroni pairwise mean comparison tests revealed a significant increase from pre-test to immediate post-test ($p < .001$, $d = .62$). No significant mean change from immediate- to delayed post-test was found ($p = .22$). Bonferroni tests also indicated that the difference between pre-test and delayed post-test was significant ($p < .001$, $d = .81$).

Table 5.34

Developmental Groups' Cloze Task Scores over Time

Developmental Condition	<i>n</i>	Pretest	Immediate	Delayed
NR	25	54.2 (8.6)	67.9 (12.9)	70.1 (8.7)
RD	29	79.8 (6.4)	84.2 (7.8)	86.2 (6.9)
Total	54	67.9%, (14.9)	76.7% (13.2)	78.7% (11.2)

Note: Standard deviations are presented in parentheses

The interaction effect between testing time and developmental condition was found to be significant, $F(2,100) = 11.81$ $p < .01$ (for a table of pairwise comparisons, see Table 5.33 B in Appendix I).

Table 5.34 displays cloze task means for developmental groups over time. Within the NR group, Bonferroni pairwise mean comparison tests revealed a mean increase from pre-test to post-test ($p < .001$, $d = 1.23$), but no significant differences from immediate to delayed post-test ($p = .66$). In comparison to the pre-test mean, the delayed post-test mean remained significantly higher ($p < .001$, $d = 1.80$). Within the RD group, Bonferroni tests did not reveal a significant difference between pre-test and immediate post-test ($p = .06$), nor a significant difference between immediate- and delayed post-test ($p = .56$). The mean difference between pre-test and delayed post-test was significant ($p < .001$, $d = .94$), however.

Results from the analyses of variance indicated no differential effects between environments on learners' score changes; neither the interaction between learning environment and testing time, $F(2,100) = 1.06$, $p = 0.35$, nor the interaction between developmental condition, learning environment and testing time was found to be significant, $F(2,100) = 0.71$, $p = 0.50$ (see Table 5.35 in Appendix K for means and standard deviations and Figure 5.1 in Appendix J for a graphic of score evolution).

5.1.4.1.2 Perfective and imperfective use. Differences in the appropriate use of perfective and imperfective were analyzed using mixed design analyses of variance (between: developmental group and learning environment; within: test time, grammatical aspect). The ANOVA table is presented in Appendix I as Table 5.36.

Table 5.37

Cloze Task Perfective and Imperfective Means over Time

Grammatical Aspect	Pre-test	Immediate	Delayed
Perfective	83.9%	83.1%	85.4%
$n = 54$	(10.5)	(11.7)	(12.4)
Imperfective	55.6%	73.9%	76%
$n = 54$	(28.4)	(20.7)	(19.9)

Standard deviations are presented in parentheses

ANOVA results yielded statistical significance for the interaction effect between grammatical aspect and test time, $F(2,100) = 5.07$, $p < 0.01$ (for pairwise comparisons, see Table 5.36 A and B in Appendix I). Table 5.37 shows perfective and imperfective means over time. Bonferroni pairwise comparison of perfective means did not indicate

any significant differences between testing times: pre-test and immediate post-test ($p = 1$), immediate and delayed post-test ($p = .29$), or pre-test and delayed post-test ($p = 1$). Bonferroni tests on imperfective means, however, yielded a significant mean increase from pre-test to immediate post-test ($p < .001$, $d = .83$), and from pre-test to delayed post-test ($p < .001$, $d = .74$). The mean difference between immediate and delayed post-test was not significant ($p = .96$). Pairwise comparisons indicated that the difference between perfective and imperfective means was significant at all testing times: pre-test, ($p < .001$, $d = 1.32$), post-test, ($p = .001$, $d = .54$), and delayed post-test ($p = .002$, $d = .56$).

The analyses of variance further indicated a significant interaction between developmental condition, grammatical aspect and test time, $F(2, 100) = 10.55$, $p < .01$. The table of pairwise comparisons is presented in Appendix I as Table 5.36 C. The interaction between these three variables is illustrated in Figure 5.2. The dotted lines in Figure 5.2 illustrate perfective changes over time in both developmental groups.

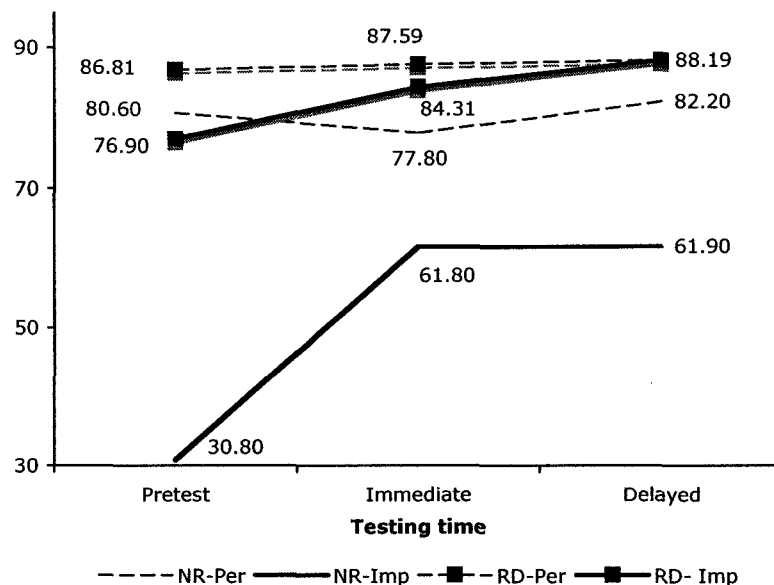


Figure 5.2 Developmental groups' perfective and imperfective means over time

Bonferroni pairwise mean comparison tests within the NR group showed no significant mean differences between testing times: pre-test and immediate post-test ($p = .40$), pre-test and delayed post-test ($p = 1$), and immediate post-test and delayed post-test ($p = .12$) (see the dotted line without squares in Figure 5.2). The dotted line with solid squares in Figure 5.2 illustrates the use of perfective by learners in the RD condition; Bonferroni pairwise tests did not yield significant differences in perfective use by RD participants between testing times: pre-test and immediate post-test ($p = 1$), pre-test and delayed post-test ($p = 1$), and immediate post-test and delayed post-test ($p = 1$).

Bonferroni pairwise mean comparisons within the NR group indicated imperfective changes from pre-test to immediate post-test (see the solid line without squares on Figure 5.2) ($p < .001$, $d = 1.45$), but no changes from immediate to delayed post-test ($p = 1$); the mean difference between pre-test and delayed post-test remained significant ($p < .001$). Within the RD group, Bonferroni tests revealed a significant imperfective mean difference only between pre-test and delayed post-test ($p < .001$, $d = 1.03$) (see the solid line with squares in Figure 5.2). Neither the mean difference from pre-test to immediate post-test ($p = 1$), nor the mean difference between immediate- and delayed post-test ($p = 1$) were significant.

The multimedia environment condition proved to have no effect on perfective and imperfective scores, as the interaction between environment, grammatical aspect and test time was not significant, $F(2,100) = 0.48$, $p = 0.62$, nor was the interaction between environment, developmental condition, grammatical aspect and test time, $F(2, 100) = 0.25$, $p = 0.78$. The interaction of these four variables is illustrated in Figures 5.3 and 5.4 in Appendix J. Means and standard deviations are provided in Table 5.38 in Appendix K.

5.1.4.1.3 *Prototypical and non-prototypical marking.* The appropriate use of prototypical and non-prototypical past tense was examined using mixed design analyses of variance (between: developmental condition and environment; within: testing time and past type). The ANOVA table is presented in Appendix I as Table 3.39. Results from the analyses of variance showed a significant effect for past type, $F(1,50) = 54.37$, $p = 0.01$, $d = .54$, as learners did better in prototypical ($n = 54$, $M = 78.5\%$, $SD = 15.4$) than non-prototypical contexts ($n = 54$, $M = 70.4\%$, $SD = 14.4$) in the cloze task.

The analyses also revealed a significant interaction effect between past type and developmental condition, $F(1,50) = 4.76$, $p = 0.03$. The tables for pairwise comparisons are presented in Appendix I as Table 5.39 A and B.

Bonferroni pairwise mean comparison tests revealed that NR participants did better in prototypical ($n = 25$, $M = 67\%$, $SD = 13.1\%$) than non-prototypical contexts ($n = 25$, $M = 61.2\%$, $SD = 12.7\%$; $p = .001$, $d = .45$). Similarly, Bonferroni tests indicated that RD participants scored higher in prototypical ($n = 29$, $M = 88.7\%$, $SD = 7.9$) than non-prototypical contexts ($n = 29$, $M = 77.9\%$, $SD = 10.2$, $p = .001$, $d = 1.15$). The pairwise comparison tests on mean differences between developmental groups indicated that RD participants ($n = 29$, $M = 88.7\%$, $SD = 7.9$) were better able to identify prototypical contexts than their NR counterparts ($n = 25$, $M = 67.01\%$, $SD = 13.12$, $p < .001$, $d = 2.0$) and that the RD group ($n = 29$, $M = 77.9\%$, $SD = 10.1$) was also better able to identify non-prototypical contexts than the NR group ($n = 25$, $M = 61.2\%$, $SD = 12.7$, $p < .001$, $d = 1.45$).

Table 5.40

E1 and E2 Groups' Prototypical and Non-prototypical Cloze Task Scores after Mixed Design ANOVAs

Experimental Group	<i>n</i>	Past Tense Type	
		Prototypical	Non-Prototypical
E1	24	79.2% (15.1)	67.6% (14.3)
E2	30	78% (15.8)	72.7% (14.2)

Standard deviations are provided in parentheses.

The interaction between past type and learning environment also yielded significant difference, $F(1,50) = 8.40$, $p = 0.01$, as it did during the organization of the groups. The tables for pairwise comparisons are presented in Appendix I as Tables 5.39 C and D. Table 5.40 displays prototypical and non-prototypical means and standard deviations for E1 and E2 groups. Bonferroni pairwise mean comparison tests indicated that mean differences between environment groups were not significant for prototypical past ($p = .24$), nor for non-prototypical past ($p = .11$). Bonferroni tests revealed that the mean differences between prototypical and non-prototypical means within the environment E1 ($p < .001$, $d = .77$) and Environment E2 ($p = .002$, $d = .35$) groups were significant. In both environment groups, participants exhibited better scores in prototypical than non-prototypical contexts.

The interaction between testing time and past type, $F(2,100) = 0.01$, $p = 0.99$, proved not to be significant. The experimental condition to which learners were assigned

seemed also not to have had an effect on the prototypical and non-prototypical scores in the cloze, as the interaction between developmental condition, learning environment, test time and past type, $F(2,100) = 1.90$, $p = 0.16$, did not yield significance. Table 5.41 in Appendix K presents means and standard deviations for the interaction of these four variables.

5.1.4.2 Situational Task Score Changes

Mixed design analyses of variance were used, to examine changes in situational task scores, perfective and imperfective use and prototypical and non-prototypical past.

5.1.4.2.1 *Overall past tense.* Mixed design analyses of variance (between: developmental condition, environment; within: testing time) revealed that RD participants achieved higher scores than NR participants, $F(1,50) = 13.03$, $p < .01$, (the ANOVA table is presented in Appendix I as Table 5.42).

A significant effect was found for test time, suggesting changes in the situational task scores after the treatment, $F(2,100) = 3.44$, $p = .04$ (for a table of pairwise mean comparisons see Table 5.42 A in Appendix I); Table 5.43 displays means over time.

Table 5.43

Situational Task Scores Over Time

Pre-test	Immediate post-test	Delayed post-test
$n = 54$	$n = 54$	$n = 54$
74.41%	77.07%	79.90%
(20.30)	(17.02)	(15.56)

Standard deviations are provided in parentheses

The significant main effect for test time resulted from a significant linear trend, $F(2,100) = 5.05, p = .029$, but not from significant mean differences between testing times; the Bonferroni pairwise mean comparison tests revealed that none of the mean differences between testing times was significant: pre-test and immediate post-test ($p = .503$), immediate and delayed post-test ($p = .087$), and pre-test and delayed post-test ($p = .420$).

Neither developmental condition nor multimedia environment led to differential score changes; the interaction between testing time and developmental condition, $F(2,100) = 0.97, p = 0.38$, and testing time and learning environment, $F(2,100) = 2.35, p = 0.10$, yielded no significance. Moreover, the interaction between developmental condition, learning environment and testing time proved not to be significant, $F(2,100) = 0.65, p = 0.53$. Means and standard deviations for the interaction of these three variables are presented in Table 5.44 in Appendix K.

5.1.4.2.2 Perfective and imperfective. The scores that participants obtained in the cloze task were further examined to identify significant changes in grammatical aspect over time, using mixed design analyses of variance (between: developmental condition and learning environment; within: test time and grammatical aspect). The ANOVA table is presented in Appendix I as Table 5.45.

Results yielded no significant effect for grammatical aspect, $F(1,100) = .94, p = .34$, or for the interaction between grammatical aspect and testing time, $F(2,100) = 1.83, p = .17$. There was also no interaction between developmental condition, environment, grammatical aspect and testing time, $F(2,100) = .46, p = .64$. The experimental groups'

perfective and imperfective means and standard deviations are provided in Table 5.46 in Appendix K.

5.1.4.2.3 Prototypical and non-prototypical marking. Mixed design analyses of variance (between: developmental condition, learning environment; within: testing time, past type) were used to determine changes in prototypical and non-prototypical past tense over time. The ANOVA table is presented in Appendix I as Table 5.47.

The analyses of variance indicated a significant effect for past type $F(1,50) = 14.88$, $p = .01$; all participants did better with prototypical ($n = 54$ $M = 79.73\%$, $SD = 20.47$) than non-prototypical past ($n = 54$, $M = 74.52\%$, $SD = 18.25$); the effect size was small, however, $d = .24$. Neither the interaction between past type and testing time, $F(2,100) = 1.89$, $p = .16$, nor the interaction between past type, testing time and learning environment, $F(2,100) = .34$, $p = .71$, proved to be significant.

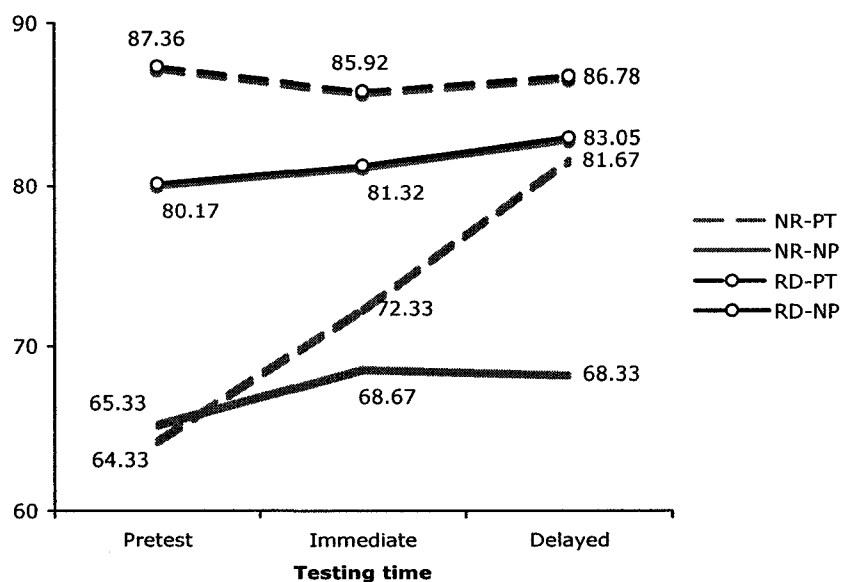


Figure 5.5 Developmental groups' prototypical and non-prototypical situational task means over time

The interaction between past type, testing time and developmental condition was significant, $F(2,100) = 5.56$, $p = .01$. Tables with mean differences, standard errors and pairwise comparison probabilities appear in Appendix I as Tables 5.47 A and 5.47 B.

Figure 5.5 above displays the evolution of the developmental groups' prototypical and non-prototypical situational task means over time (means and standard deviations are provided in Appendix K, in Table 5.48). The grey and black solid lines in Figure 5.5 illustrate the evolution of NR and RD participants' non-prototypical (i.e., NP) means over time respectively. The lines illustrate very small non-prototypical changes over time within RD and NR groups. Bonferroni pairwise mean comparison tests within groups revealed no significant prototypical mean differences between testing times (see Table 5.49, for pairwise comparisons' probabilities and effect sizes for mean differences), with small effects size for all mean comparisons.

The developmental groups' prototypical use of past tense markers over time is represented with dotted lines in Figure 5.5. The dotted black line illustrates the evolution of RD participants and the dotted grey line illustrates the evolution of NR participants. Bonferroni pairwise mean comparison tests revealed a significant mean difference in the appropriate use of prototypical past tense within the NR group only between pre-test and delayed post-test ($p < .001$, $d = .72$) (see Table 5.49 in Appendix L, for pairwise comparisons' probabilities and effect sizes for mean differences). Within the RD group, none of the prototypical mean differences between testing times was significant.

Bonferroni tests also revealed no significant mean differences between the use of prototypical and non-prototypical past within the RD group at each testing time. Within the NR group, however, pairwise comparisons revealed that the use of prototypical past

tense became significantly higher than the use of non-prototypical past at the delayed post-test ($p < .001$, $d = .65$) (see Table 5.49 in Appendix L, for pairwise comparisons' probabilities and effect sizes for mean differences).

The environment to which RD and NR learners were exposed seemed not to have influenced the prototypical and non-prototypical trends over time; the interaction between developmental condition, learning environment, test time and past type did not yield a significant effect, $F(2,100) = .29$, $p = .75$ (means and standard deviations for the interaction between these variables are presented in Table 5.50 in Appendix K).

5.1.4.3 Listening Score Changes

Learners' answers in the listening task were analyzed for the total number of appropriate answers, the number of appropriate perfective and imperfective choices, and the number of appropriate choice of prototypical and non-prototypical answers.

5.1.4.3.1 Overall past tense score changes. Learners' appropriate answers in the listening task were examined using mixed design analyses of variance (between: developmental condition and learning environment; within: testing times). The ANOVA table is presented in Appendix I as Table 5.51. The analyses of variance did not yield a significant main effect for test time, $F(2,100) = 0.25$, $p = 0.78$. The interaction between developmental condition and test time proved not to be significant either, $F(2,100) = 2.22$, $p = 0.11$. ANOVA results revealed a significant interaction between environment and testing time, $F(2,100) = 3.39$, $p = .04$. Tables 5.51 A and B in Appendix I display the mean differences and standard errors for pairwise comparisons. The evolution of the multimedia groups' score means in the listening test is illustrated below in Figure 5.6. Means and standard deviations are provided in Table 5.52 in Appendix K.

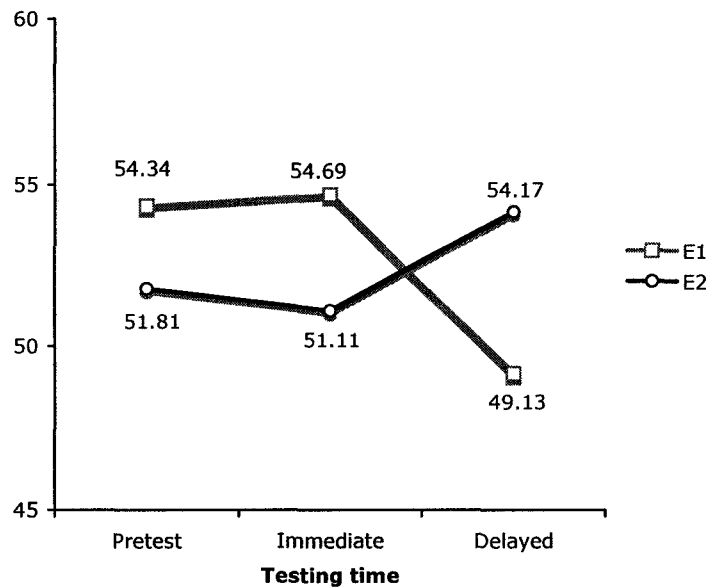


Figure 5.6 Multimedia environment groups' listening score means over time

Figure 5.6 shows that among learners assigned to E1 the identification of appropriate responses did not evolve from pre-test to immediate post-test; the mean of appropriate responses decreased from immediate to delayed post-test, however. Among learners exposed to E2, the opposite trend was observed: while means remained almost identical from pre-test to post-test, they increased from immediate to delayed post-test. Bonferroni pairwise mean comparison tests indicated that none of the mean differences between or within testing times was significant, in reference to the adjusted alpha for multiple comparisons. Probabilities and effect sizes for mean pairs are provided in Table 5.53 in Appendix L.

The interaction between developmental condition, environment and testing time was not significant $F(2,100) = 0.16, p = 0.85$. Means and standard deviations for the interaction of these three variables are provided in Table 5.54 in Appendix K.

5.1.4.3.2 *Perfective and imperfective.* Learners' answers in the listening test were analyzed to identify the effects of the treatment on grammatical aspect score changes, using mixed design analyses of variance (between: developmental condition and learning environment; within: test time and grammatical aspect). The ANOVA table is presented in Appendix I as Table 5.55.

ANOVA results showed a significant effect for grammatical aspect, $F(1,50) = 26.13, p < .01, d = .92$. Participants were better at identifying perfective ($n = 54, M = 59.58, SD = 15.78$) than imperfective ($n = 54, M = 45.41, SD = 14.71$) prompts. The interaction between testing time and grammatical aspect yielded no significant effect, $F(2, 100) = 2.61, p = 0.08$. Neither developmental condition $F(2, 100) = 1.78, p = 0.18$, nor learning environment, $F(2, 100) = 0.11, p = 0.90$, had an impact on perfective and imperfective score changes overtime. The interaction between developmental condition, learning environment, grammatical aspect and testing time proved not to be significant either, $F(2,100) = 2.43, p = 0.09$. Means and standard deviations for the interaction of these four variables are presented in Table 5.56, in Appendix K.

5.1.4.3.3 *Prototypical and non-prototypical marking.* Mixed design analyses of variance (between: developmental condition, learning environment; within: testing time, past type) were used to test significant changes in appropriate identification of prototypical and non-prototypical prompts over time. The ANOVA table is presented in Appendix I as Table 5.57. The analyses revealed a significant effect for past type, $F(1,50) = 69.19, p < 0.01, d = 1.16$; participants did better with prototypical ($n = 54, M = 61.73, SD = 15.09$) than non-prototypical ($n = 54, M = 44.75, SD = 13.96$) targets.

The interaction between past type and testing time was found significant, $F(2,100) = 5.55, p = 0.01$. Mean differences, standard errors and pairwise comparison probabilities appear in Appendix I in Table 5.57 A and Table 5.57 B. The evolution of prototypical and non-prototypical means is illustrated in Figure 5.7; the dotted line illustrates changes in prototypical means; the solid line shows the evolution of the non-prototypical means. Means and standard deviations appear in Table 5.58 in Appendix K.

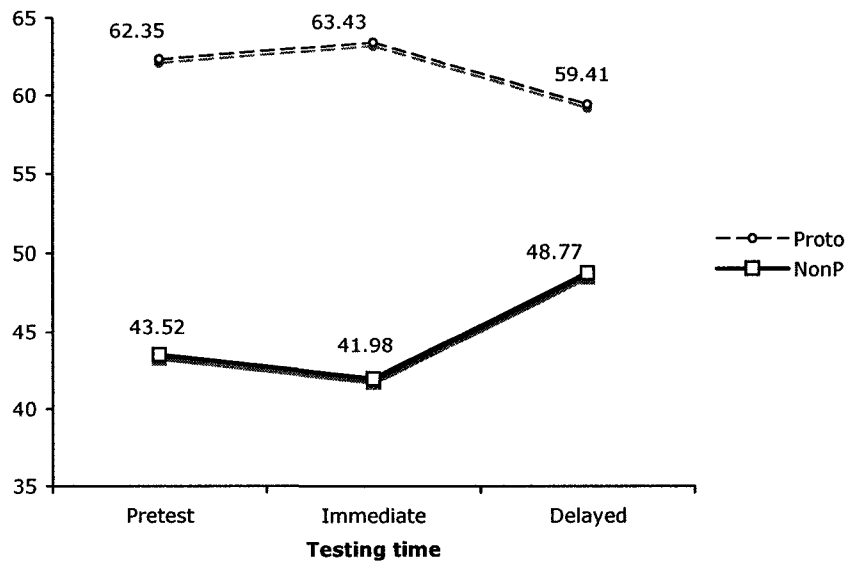


Figure 5.7 Prototypical and non-prototypical listening score means over time

Bonferroni tests on prototypical means revealed no significant differences between testing times: pre-test and immediate post-test ($p = 1$), immediate and delayed post test ($p = .49$), and pre-test and delayed post-test ($p = .27$). Bonferroni tests did not indicate significant non-prototypical mean differences between testing times either: pre- and post test ($p = 1$), immediate and delayed post-test ($p = .03$), and pre-test and delayed post-test ($p = .12$). Pairwise comparisons indicated, however, that the prototypical and non-prototypical mean difference remained significant at all times: pre-test ($p < .001, d = 1.27$), immediate post-test ($p < .001, d = 1.43$) and delayed post-test ($p < .001, d = .68$).

Neither developmental condition, $F(2,100) = 0.35$, $p = 0.70$, nor learning environment, $F(2,100) = 2.14$, $p = 0.12$, had an impact on the prototypical and non-prototypical means over time. The interaction between developmental condition, learning environment, test time and past type was not found significant either, $F(2,100) = 0.38$, $p = 0.68$. Means and standard deviations for this interaction are presented in Table 5.59 in Appendix K.

5.1.4.4 Reaction Time Changes

The amount of time that students required to provide appropriate answers in the listening test was analyzed to identify reaction time changes in all past tense targets, in the identification of perfective and imperfective answers, and in the identification of prototypical and non-prototypical targets.

5.1.4.4.1 Overall past tense score changes. Mixed design analyses of variance were used to compare the RTs for appropriate answers in the test (between: developmental condition and learning environment; within: testing time); the ANOVA table is presented in Appendix I as Table 5.60. The analyses revealed that learners became faster at providing appropriate answers over time, as a significant effect for testing time was found, $F(2,100) = 6.48$, $p < 0.01$. Standard errors, mean differences and pairwise comparison probabilities appear in Appendix I, in Table 5.60 A.

Bonferroni pairwise mean comparison tests revealed no significant reaction time differences between pre-test ($n = 54$, $M = 450$, $SD = 122$) and immediate post-test ($n = 54$, $M = 417$, $SD = 128$, $p = 0.13$), nor between immediate ($n = 54$, $M = 417$, $SD = 128$) and delayed post-test ($n = 54$, $M = 388$, $SD = 110$, $p = 0.27$). Bonferroni tests indicated, however, that learners were faster at providing appropriate answers at the delayed post-

test time ($n = 54$, $M = 388$, $SD = 110$) than at pre-test time ($n = 54$, $M = 45$, $SD = 122$, $p = 0.006$, $d = -0.54$).

The ANOVA results revealed that neither developmental condition, $F(2,100) = 0.17$, $p = 0.84$, nor learning environment, $F(2, 100) = 0.56$, $p = 0.58$, had impacted reaction time changes over time. There was also no interaction between developmental condition, learning environment and testing time, $F(2,100) = 0.12$, $p = 0.89$. Means and standard deviations are presented in Table 5.61 in Appendix K.

5.1.4.4.2 Perfective and imperfective choice. Mixed design analyses of variance were used to identify significant differences within and between experimental groups' perfective and imperfective reaction times over time (between: developmental condition, learning environment; within: testing time and grammatical aspect). The ANOVA table is presented in Appendix I as Table 5.62.

Results yielded a significant effect for grammatical aspect, $F(1,50) = 7.16$, $p < .01$, $d = .31$; learners were faster at identifying appropriate perfective ($n = 54$, $M = 396.13$, $SD = 158.65$) than imperfective ($n = 54$, $M = 444.71$, $SD = 149.83$) answers. Results indicated no significant interaction between testing time and grammatical aspect, $F(2,100) = 0.27$, $p = 0.76$. No significant interaction was found between developmental condition, testing time and grammatical aspect, $F(2,100) = 1.37$, $p = 0.26$, or between learning environment, testing time and grammatical aspect, $F(2,100) = 0.45$, $p = 0.64$. The interaction between developmental condition, learning environment, testing time and grammatical aspect was not significant either, $F(2,100) = 0.15$, $p = 0.86$. Means and standard deviations are presented in Table 5.63 in Appendix K.

5.1.4.4.3 Prototypical and non-prototypical scores. The amount of time that participants required to provide appropriate answers with prototypical and non-prototypical prompts was compared between experimental groups using mixed design ANOVA (between: developmental condition, learning environment; within: testing time and past type). The ANOVA table is presented in Appendix I as Table 5.64. ANOVA results revealed a significant main effect on past type, $F(1,50) = 70.29, p < 0.01, d = .81$, as learners were faster at identifying appropriate prototypical ($n = 54, M = 361.01, SD = 138.31$) than non-prototypical ($n = 54, M = 479.83, SD = 151.80$) answers.

The interaction between past type and testing time did not yield statistical significance, $F(2,100) = 0.03, p = 0.97$. Neither developmental condition, $F(2,100) = 1.36, p = 0.26$, nor learning environment $F(2,100) = 1.55, p = 0.22$, proved to impact perfective or imperfective time reaction changes over time. The interaction between developmental condition, learning environment, past type and testing time did not yield statistical significance either, $F(2,100) = 1.29, p = 0.28$. Means and standard deviations are presented in Table 5.65 in Appendix K.

5.1.4.5 Summary of Treatment Effects

Effects on cloze task scores. ANOVA results showed score improvement in the production task after multimedia instruction. Improvement was mediated by the participants' developmental condition. Among NR learners, scores improved immediately after treatment. Three weeks after multimedia instruction, in a delayed post-test, NR learners' scores remained significantly higher in comparison to scores prior to the treatment and exhibited no changes with respect to scores obtained at immediate post-

test time. Among RD learners, in comparison to scores prior to multimedia instruction, scores showed significant changes only three weeks after the treatment.

Results indicated that the different multimedia environments to which learners were exposed had no significant impact on score changes.

In terms of grammatical aspect, learners exhibited a preference for perfective over imperfective across testing times. Grammatical aspect had an effect on score changes. Perfective scores were not affected by the treatment in either developmental condition. The treatment did facilitate imperfective score changes. Changes were mediated by developmental condition, but not by learning environment. NR participants improved in imperfective use from pre-test to immediate post-test and score improvement remained three weeks later. RD participants, however, did not exhibit changes in imperfective immediately after the treatment, but did three weeks later.

All learners exhibited better use of past tense markers in prototypical than in non-prototypical contexts. Past tense type did not show to significantly interact with test time, learning environment and developmental condition.

Effects on situational task results. RD learners achieved higher scores than NR learners in the test. The analyses revealed a significant mean increase over time in the situational task. Neither developmental condition nor multimedia environment had an effect on test scores. Neither grammatical aspect nor past type proved to influence participants' scores.

Effects on listening task scores. The results of analyses of variance showed no significant score differences between developmental groups; further, analyses of grammatical aspect and past type revealed that all participants exhibited higher scores in

contexts where learners needed to identify perfective than imperfective prompts and that learners exhibited better prompt identification in prototypical than non-prototypical past tense contexts.

Results indicated no significant changes in mean scores over time. The analyses of variance did reveal two significant interactions over time: (a) environment and testing time and (b) past type and testing time. With respect to environment and testing time, learners exposed to E2 exhibited a mean increase from immediate- to delayed post-test, whereas learners exposed to E1 exhibited a mean decrease from immediate to delayed post-test. The mean difference between E1 and E2 at the delayed post-test was not significant, however. With respect to the significant interaction found between past type and testing time, participants exhibited a robust increase in the non-prototypical mean from immediate to delayed post-test, but the mean difference between testing times proved not to be significant.

Effects on reaction times. Results indicated that learners gradually became faster at providing appropriate answers in the listening task over time, with statistical significance between pre-test and delayed post-test only. Results also showed that learners were faster at identifying perfective than imperfective sentences, and at identifying prototypical than non-prototypical prompts. These reaction time patterns were not affected by developmental condition, learning environment, or testing time.

5.2 Treatment and Classroom Reports

To provide evidence on variables that may have impacted the effectiveness of the multimedia treatment, this section of Chapter 5 reports data collected on learners'

attention to the multimedia lessons and teachers' attention to past tense during their regular classroom practices during the implementation of the treatment. To maintain the anonymity of the participating teachers and students, fictitious names are used. Further, the pronoun *he* is used as a generic third person singular pronoun, not to reveal the gender of the learner or teachers being referred to. The code assigned to the classes in the reports does not relate in any way to the French level or institutional code use for the various French sections that participated in the study.

5.2.1 Learners' Attention to the Multimedia Lessons

Three instruments were used to document learners' attention to all multimedia lessons and their form-focussing procedures: lesson logs, lesson questionnaires administered immediately upon completion of the lesson and input enhancement questions presented at the end of the project during final classroom visits. Data from each instrument are reported separately in the following sections.

5.2.1.1 Logs (Lesson 1)

The multimedia environment generated a total of 216 logs during the implementation of the treatment; that is, for each participant, the environment generated four lesson logs. The purpose of these logs was to document patterns of interaction between the learner and the computer and the amount of time that learners spent interacting with the computer, to identify the degree of attention that learners paid to the lesson and its various stages.

During the analyses of the logs, it was noted, however, that logs from Lesson 2 through 4 did not provide any revealing patterns of interaction or time. There appear to be two main reasons for this. First, the time that learners needed to complete Lessons 2

and 4 had been pre-determined during the design of the environment, to ensure balanced distribution of time across the various stages of the lesson. For instance in Lesson 2, the amount of time that learners were exposed to the written form of the text was 20 seconds; then, the length of the dictation was determined by the length of the audio file; during the reconstruction of the text, learners were provided with 10 minutes to reconstruct the text; and then 10 minutes to work with a peer; and so forth.

Second, during Lessons 2 and 4, learners needed to work with their peers, to reconstruct their corresponding stories. These moments in which learners collaborated with peers were the class episodes that could have revealed information on the attention that learners paid to the treatment, but the computer software was not designed to record learner-learner interaction.

In other words, during Lessons 2 and 4, there was less interaction with the computer and more with other students. Similarly, during lesson 3, the patterns of interaction between the learner and the computer had been predetermined during the design of the environment. Logs from Lesson 1, however, became highly revealing, because the patterns of interaction between the learner and the computer and the amount of time required for such an interaction were dependent on learners' performance in the task.

During Lesson 1, learners reconstructed a story from scrambled sentences. Throughout the reconstruction of the story, the computer saved learners' appropriate and erroneous sentence choices and the amount of time that learners spent on their answer selection. When learners selected an erroneous sentence, the computer presented learners with feedback in the form of metalinguistic clues, to direct their attention to the actions in

the story and the manner in which they were occurring. Then learners were sent back to the turn in which they had made the error and were given the opportunity to reconsider the answer choice. The computer tracked the time that learners spent on feedback sentences and their sentences choices.

Data collected through Log 1 are presented in two subsections: one describes the number of erroneous sentences generated by learners per experimental group and the number of prompt sets delivered by the computer; the other section describes the amount of time that learners spent on the prompt sets and on the selection of appropriate and erroneous sentences.

Table 5.66

Experimental Groups' Erroneous Sentence Selection, Prompt Sets and Repair

Group	Event	Error	Prompts	Incor Repair	Cor Repair	Imm. Repair	Del. Repair
NR-E1	21	93	139	46	93	53	40
		[4.4]	(1.5)	33.1%	66.9%	57%	43%
RD-E1	19	83	129	46	83	39	44
		[4.4]	(1.6)	35.7%	64.3%	47%	53%
NR-E2	21	118	172	54	118	59	59
		[5.6]	(1.5)	31.4%	68.7%	50%	50%
RD-E2	20	86	108	22	86	47	39
		[4.3]	(1.3)	20.4%	79.6%	54.7%	45.3%

Note: Within each experimental group Cor and Incorpor Repair add up to 100%; similarly, Imm and Del Repairs add to 100%

5.2.1.1.1. *Counts of appropriate and erroneous sentences and prompt sets.* The story that learners needed to reconstruct in their corresponding learning environment included a total of 24 events; however, only 22 events were considered for the analyses presented in this section. This was because the first two events were given to learners as the scrambled sentence story start. For each developmental group, story events that triggered an erroneous sentence selection were counted; the resulting number of error-triggering events is displayed in Table 5.66 under the column *Event*. All erroneous sentence choices during the completion of the task were added up; the resulting number is displayed under column *Error*. Then, an error ratio was obtained by dividing the number of erroneous choices by the number of error-triggering events. This error ratio is presented in brackets under the column *Error*.

For each experimental group, the feedback turns or prompt sets that the computer exposed the learner to throughout the task were counted and a ratio was obtained by dividing the number of erroneous choices by the number of prompt sets. The column *Prompts* displays both the raw number of prompt sets and the prompt ratio. Prompt ratios are presented in parentheses. All prompts led learners to a new sentence selection; correct selections were coded as *Correct Repairs* and are presented under the column *Cor Repair*. Incorrect selections were coded as *Incorrect Repairs*. Percentages of correct and incorrect repairs were then obtained using the formulae presented below.

$$\text{Percentage of incorrect repair} = \frac{\text{Incorrect Repairs} \times 100}{(\text{Correct Repair} + \text{Incorrect Repairs})}$$

$$\text{Percentage of correct repair} = \frac{\text{Correct Repairs} \times 100}{(\text{Correct Repair} + \text{Incorrect Repairs})}$$

Raw counts and percentages of correct and incorrect repairs are presented under the columns *Cor Repair* and *Incor Repair* in Table 5.66. Correct repairs that resulted from a first prompt set were coded as *Immediate Repair* and correct repairs that resulted from a second or later prompt set were coded as *Delayed Repair*. Table 5.66 displays the number of immediate and delayed repairs under columns *Imm Repair* and *Del Repair* respectively. Percentages of immediate and delayed correct repairs were computed as illustrated below.

$$\text{Percentage of Immediate Repair} = \frac{\text{Immediate Repairs} * 100}{(\text{Immediate Repairs} + \text{Delayed Repairs})}$$

$$\text{Percentage of Delayed Repair} = \frac{\text{Delayed Repairs} * 100}{(\text{Immediate Repair} + \text{Delayed Repairs})}$$

Table 5.66 shows that the task triggered different error ratios among NR learners exposed to E1 and E2. NR learners exposed to E2 exhibited a larger error ratio than NR learners in E1. Indeed, NR learners in E2 exhibited the largest error ratio of all four experimental groups. RD learners exposed to E1 and E2 exhibited almost equal error ratios. Chi square analyses of the error frequency between groups indicated that NR learners were more likely to make errors (add errors produced by NR learners in E1 and E2) than their RD counterparts (add errors produced by RD learners in E1 and E2), as a significant association between error frequency and developmental condition was found, $\chi^2(1) = 16.52, p < .01$. Further, chi square analyses revealed that NR learners assigned to E2 were more likely to err in the task than NR learners assigned to E1, as a significant

association was found between error, developmental condition and learning environment, $\chi^2(1) = 7.36, p < .01$. Chi square tables appear as Tables 5.66 A and B in Appendix M.

With respect to the number of prompt sets delivered by the computer program, Table 5.66 shows that NR learners exposed to E2 received the largest number of prompt sets. Learners in this experimental group also exhibited the largest number of incorrect repairs. However, RD learners exposed to E1 exhibited the largest percentage of erroneous incorrect repairs in the task and the smallest percentage of immediate repairs. RD in E2 exhibited the smallest number of incorrect repairs. The frequency of immediate correct and incorrect repairs elicited by the prompt sets was examined using chi square analyses. These results did not yield a significant association between the type of repair (immediate or delayed) and learning environment, $\chi^2(1) < .01, p < .95$; repair type and developmental condition, $\chi^2(1) = .27, p < .60$; and repair type, learning environment and developmental condition, $\chi^2(1) = 2, p = .16$. Chi square tables are included as Tables 5.66 C and D in Appendix M.

5.2.1.1.2 Time on appropriate and erroneous sentences and prompt sets. The number of seconds that each learner spent on the selection of erroneous sentences in the task was added up and then divided by the total number of erroneous sentences that had contributed to the time addition. Means and standard deviations were then obtained for each experimental group. These data are presented under the column *Error* in Table 5.67. The same procedure was used to obtain the means and standard deviations for prompts, incorrect repairs, correct repairs, immediate repairs and delayed repairs also included in Table 5.67.

Table 5.67

Time on Appropriate and Erroneous Sentences and Prompt Sets

Group	Error	Prompt	Incor Repair	Cor Repair	Imm Repair	Del Repair
NR-E1	26.06	3.09	6.10	4.20	4.01	4.56
	(16.46)	(3.15)	(3.62)	(2.13)	(1.89)	(3.79)
RD-E1	22.07	3.03	7.92	6.30	5.55	6.72
	(9.78)	(1.74)	(4.74)	(4.17)	(4.00)	(4.65)
NR-E2	26.44	3.29	13.71	6.91	5.21	9.62
	(13.41)	(3.82)	(20.25)	(4.11)	(4.19)	(8.99)
RD-E2	30.41	7.30	5.17	6.79	7.99	3.27
	(19.04)	(8.79)	(6.67)	(5.12)	(5.79)	(3.20)

Note: Standard deviations are presented in parentheses; all times are in seconds.

It was observed during the analyses of the Log 1, however, that the time means that resulted for the prompt category were not representative of the actual number of seconds that learners spent reading the prompt sets. There was a time discrepancy between prompt set rounds; in other words, learners were observed to spend more time on the first set of prompts they were exposed to than on the second round of prompt set, and almost no time after the third prompt set round. This observation led to a new coding of the time learners had spent on prompts. The time that learners spent on prompts was coded for First Prompt Set, Second Prompt Set and Third Prompt set. Results are presented in Table 5.68.

Table 5.68

Experimental Groups' Time on Prompt Sets 1, 2, and 3

Group	Prompt set 1	Prompt set 2	Prompt set 3
NR-E1	19.08 (17.72)	1.08 (0.79)	0.67 (0.49)
RD-E1	19.42 (6.46)	3.17 (4.82)	1.25 (1.60)
NR-E2	17.69 (19.16)	6.77 (9.67)	2.54 (4.75)
RD-E2	19.18 (17.72)	1.65 (2.15)	1.65 (4.26)
	18.85 (13.12)	3.09 (5.69)	1.56 (3.41)

Note: Standard deviations are presented in parentheses; all times are in seconds.

Table 5.67 shows that, in comparison to the other three experimental groups, RD learners exposed to E1 exhibited the lowest time mean at producing initial erroneous sentence selections. The two-way analyses of variance that were conducted to examine time differences on error-triggering sentences between experimental groups yielded no significant effects for the interaction between developmental condition and learning environment, however, $F(1,50) = .87$, $p = .36$. The ANOVA table is included in Appendix M, as Table 5.67 A.

With respect to the time allotted to prompt sets, the means in the bottom row of Table 5.68 show discrepancy in the amount of time that learners spent on prompt sets.

Mixed design analyses of variance (between: developmental condition and learning environment, within: prompt set) revealed a significant main effect for prompt set, $F(2,100) = 91.62, p < .01$ (for the ANOVA and pairwise mean contrast tables see Tables 5.68 A and B in Appendix M). Post-hoc analyses conducted on Prompt Set mean differences using Bonferroni pairwise comparison tests revealed that learners significantly spent less time on Prompt Set 2 than on Prompt Set 1 ($p < .001, d = -1.55$) and on Prompt Set 3 than on Prompt Set 1 ($p < .001, d = -1.79$). The mean difference between Prompt Set 2 and 3 ($p = .024, d = -.32$) did not prove to be significant.

Under the column Prompt Set 2, a robust difference can be observed between the mean of NR learners exposed to Environment E2 (i.e., non-prototypical environment) and the mean of the other experimental groups; yet, the mixed design analyses of variance did not reveal a significant interaction between learning environment, developmental condition and prompt set, $F(2,100) = 1.14, p = .32$.

With respect to the amount of time spent on repairs, Table 5.67 shows that NR learners in E2 exhibited a robust time mean at generating incorrect repairs in comparison to the other groups. Yet, two-way analyses of variance conducted to examine the effects of the interaction between developmental condition and learning environment on the time that learners spent on incorrect repairs did not yield a significant interaction effect, $F(1,50) = 2.95, p = .09$. The ANOVA table is included in Appendix M as Table 5.67 C.

Two-way analyses of variance revealed that the interaction between learning environment and developmental condition did not have a significant impact on the amount of time that learners spent on the total number of correct repairs, $F(1,50) = .947,$

$p = .335$, and immediate repairs, $F(1,50) = .273$, $p = .603$. The ANOVA tables are presented in Appendix M as Tables 5.67 D and E.

Two-way ANOVAs conducted to examine the amount of time that learners spent on delayed repairs indicated a significant interaction between developmental condition and learning environment, $F(1,50) = 7.84$, $p < .01$. The ANOVA and pairwise mean comparison tables are included in Appendix M as Tables 5.67 F – H. Post-hoc analyses conducted using Bonferroni tests on mean differences within environments revealed no differences between the amount of time that RD and NR learners spent on delayed repairs in Environment E1 (i.e., prototypical past tense environment) ($p < .34$). Within Environment E2 (i.e., non-prototypical past tense environment), post-hoc analyses revealed that NR learners were significantly slower at producing delayed repairs than their RD counterparts ($p = .003$, $d = .89$).

In summary, analyses of Log 1 revealed that, irrespective of learning environment and developmental condition, learners spent similar amounts of time throughout the various aspects of Lesson 1; yet, the analyses revealed that NR learners exposed to Environment E2, which exposed them to past tense beyond their current developmental stage, faced the most challenge during the completion of Lesson 1. In terms of feedback, the analyses revealed similar amounts of time on the prompt sets across experimental groups, but not across feedback times, as learners mostly spent time on feedback the first time they encounter it. Further, the analyses revealed that NR learners took longer to generate delayed repairs than their RD counterparts in Environment E2.

5.2.1.2 Lesson Questionnaires

A total of 216 computerized retrospective questionnaires were administered during the implementation of the treatment; that is, 54 questionnaires per lesson. Data collected for each lesson are presented separately.

As was explained in Chapter 4, each questionnaire included seven questions related to six different aspects of the lesson: (a) interest in the lesson and use of technology (Questions 1 and 2); (b) interest in the lesson multimedia task whereby past tense instruction was delivered (Question 3); (c) degree of lexical difficulty in the past tense task (Question 4); (d) past tense processing in the multimedia task (Question 5); (e) attention to feedback (Question 6); and (f) the L2 aspects that had benefited from the lesson (Question 7).

For every lesson, the frequency of learners' answers to each of the multiple-choice questions was examined using chi square analyses, to determine potential associations between experimental groups and answer choices. Associations between experimental groups and their answers were considered significant when a probability lower than .05 obtained through the Pearson Chi-Square test. A total of 28 chi-square analyses were conducted; that is, one analysis per each questionnaire question. Results are presented in Tables 5.69 – 5.72 in Appendix M.

None of the analyses revealed a significant association between experimental groups and answer choice. Therefore, no distinction is henceforth made between experimental groups and their answers to the questionnaire. Furthermore, experimental groups' answers to each of the questionnaire questions were pooled and are presented per

lesson, to illustrate learners' attitudes to each of the six aspects of the four multimedia lessons evaluated through the questionnaires.

5.2.1.2.1 *Lesson 1: Scrambled sentence task.* Percentages of participants' answers to Lesson 1 Questionnaire are displayed in Table 5.73 in Appendix N. Participants rated the topic of Lesson 1 as either very interesting (35%) or interesting (61%). During the final classroom visit, participants assigned to Environment E1 further commented that the French-Canadian legend about *Le Loup-Garou* “werewolf” had been particularly interesting to read, because it expanded their knowledge of the Francophone literature. Their regular classroom material focussed almost exclusively on literature and civilization from France.

Most participants (96%) indicated that the integration of images, sentences, and interactivity had raised their interest in the completion of the lesson. With respect to the past tense task, 98% of the learners reported that the interactive scrambled sentence task had been an interesting way to read their corresponding stories. During the final classroom visit, learners added that the *penalty* component of the scrambled sentence task had pushed them to read the sentences carefully to be able to build the story. Vocabulary in the scrambled sentence task was somewhat difficult according to 20% of the learners; the other 80% of the learners felt the vocabulary in the task was to their level.

With respect to attention to form during completion of the scrambled sentence task, 50% of the learners indicated that they had carefully read the scrambled sentences, paying special attention to verbs and their inflections; 30% of participants indicated they had carefully read all the words in sentences; and 11% of the learners indicated that they had read the sentences quickly. With respect to feedback, which was provided in the

form of metalinguistic clues during completion of the task, 50% of the learners indicated that, after receiving feedback, they had returned to the scrambled sentences and re-read them, paying particular attention to verbs and their inflection; 37% of the learners reported returning to the task and reading the sentences, word-by-word; and 11% of learners indicated they had returned to the task and quickly read the sentences.

With respect to the impact of the lesson on their French, 41% of the learners indicated that the lesson had helped them improve their vocabulary, reading and grammar. Other learners singled out particular areas of their French that had benefited from the lesson: vocabulary (19%), reading skills (15%), or grammar (24%).

5.2.1.2.2 Lesson 2: Multimedia dictogloss. Percentages of participants' answers to Lesson 2 Questionnaire are presented in Table 5.74 in Appendix N. Lesson 2 continued building on the story presented in Lesson 1. Participants rated the thematic content of Lesson 2 as very interesting (54%) or interesting (39%). During the final classroom visit, learners who had worked with E1 indicated that the listening task had helped them learn about French Canadian culture. For instance, E1 learners reported learning the difference between legends and tales and elements that are unique to French Canadian narratives.

In general, most learners (61%) indicated that the use of technology had made the lesson very interesting; 31% of learners rated the use of technology in this lesson as interesting. With respect to the past tense task, half the learners (48%) indicated that the collaborative reconstruction task was an interesting way to practice French; the other half (44%) classified this task as interesting. Most learners indicated that vocabulary in the listening task was somewhat easy (42%); other learners (33%) found vocabulary in the task was somewhat difficult; 15% of learners indicated that the vocabulary was easy.

With respect to attention to form during the reconstruction of the narrative, 61% of the learners reported that at the stage in which they needed to work individually, they had paid attention to the appropriate use of French in most of the sentences they had to reconstruct; 28% of the learners indicated they had paid attention to the appropriate use of French in some of the sentences; and 6% of learners indicated they had rarely paid attention to the appropriate use of French.

At the stage in which learners needed to collaborate with their peers to reconstruct the story, 68% of learners indicated they had negotiated the appropriate use of French with their peers in most of the sentences; 11% of learners reported negotiating the appropriate use of French in some sentences; and a small number of learners (9%) reported they rarely negotiated the appropriate use of French.

With respect to the areas of French that had benefited from this lesson, some learners (37%) indicated that the collaborative reconstruction task had helped them improve their listening, vocabulary and grammar. Other learners were more specific with respect to the areas that had benefited: 15% vocabulary, 22% grammar and 20% listening.

5.2.1.2.3 Lesson 3: True/false video-watching task. Learners' answers to the questionnaire are reported in percentages in Table 5.75. Comments that learners made to the researcher and their teachers at the end of the lesson clearly indicated their enjoyment of multimedia Lesson 3 and their involvement in the completion of the true-false video-watching task and the follow-up writing activity. These comments are also reflected in the 91% of the learners who answered that the thematic content of the lesson had been to their interest in Question 1.

The integrative use of video cartoons and interactive sentences in the multimedia lesson was rated as a very interesting (86%) or an interesting (11%) way to learn French. During the final classroom visit, learners in all seven participating classes made comments such as *"I never thought I could learn so much French watching the Pink Panther"* or *"It was fun to watch the Pink Panther to learn French."* Learners classified the true/false task as very interesting (60%) or interesting (32%). Most learners (63%) thought that vocabulary in the task was somewhat easy; 22% rated the lesson vocabulary as somewhat difficult; only 7% of learners thought the level of vocabulary was easy.

With respect to the processing of the true/false sentences that carried the target verbs and past tense, 20% of the learners indicated they had read these sentences quickly. Most learners reported, however, that they (37%) had carefully read all the sentences word-by-word, or that they (33%) had read the sentences paying attention to verbs and their verbal inflections. With respect to attention to feedback on meaning provided after indication of a true/false sentence, some learners (33%) reported that they had read these sentences quickly. Most learners, however, indicated that they had read all sentences either word-by-word (37%), or paying special attention to verbs and verbal inflections (20%). During the final classroom visit, one learner commented *"I found the true/false sentences very helpful; they helped me focus on episodes of the story of the video cartoon; then, when I needed to report the video cartoon story, I knew what episodes to report on and what verbs I needed to report them."* Other learners indicated that they retained verbs such as *s'envoler* "to fly away" or *clouer* "to nail down" from the true/false sentences, because the video cartoon had provided them with a visual representation of the action.

Overall, 32% of the learners indicated that the lesson had helped them improve their vocabulary, grammar and reading skills; 28% of the learners indicated the lesson had helped them improve their vocabulary; 20% of participants reported their grammar had benefited from the lesson; and 13% of learners said their reading skills had improved.

5.2.1.2.4 Lesson 4: Multimedia-guided writing task. Table 5.76 in Appendix N presents the percentages of learners' answers to Lesson 4 Questionnaire. Lesson 4 continued building upon the video cartoon story presented in Lesson 3. Most learners (65%) rated this lesson as very interesting, whereas 34% rated it as interesting. A high percentage of learners (56%) indicated that the use of technology as required in the lesson provided very interesting learning contexts; 44% of learners thought the use of technology in this lesson was interesting. Learners rated the multimedia-based writing task as a very interesting (54%) or an interesting (43%) way to practice French. According to most learners (65%), vocabulary in the lesson was somewhat easy, 22% of learners indicated that the vocabulary in the lesson was somewhat difficult.

With regards to attention to form, during the newspaper article writing task, learners reported that, at the individual work stage, they paid attention to the appropriate use of French in all sentences (15%), most of the sentences (74%) or some of the sentences (11%). Learners further reported negotiation of the proper use of French with their peers in all sentences (9%), in most sentences (50%), or in some sentences (26%). Only a small percentage of students reported little (4%) negotiation of appropriate use of French with their peers or no negotiation at all (7%).

Finally, with respect to the areas of French that benefited from the lesson, 50% of the learners indicated the lesson had helped them improve their grammar. Other learners

indicated that the lesson had helped them improve their vocabulary (9%), their writing (9%), or these three aspects of French (32%).

5.2.1.3 Input Enhancement Questionnaire

All seven participating classes were visited at the end of the project, and as learners described their experience in the project, all questions included in the Input Enhancement Questionnaire were delivered orally. From learners' answers in all classes, the three following patterns of noticing facilitated by the input enhancement feature in the environment emerged.

First, some learners indicated that they noticed that verbs in *passé composé* were highlighted in blue, whereas verbs in *imparfait* were highlighted in green during the first multimedia lesson. A second group of learners reported having realized that the *passé composé/imparfait* distinction had been highlighted with different colours during the second or third lesson. A third group of learners indicated that they had realized that some sentences included green fonts and other sentences included blue fonts; it was, however, through comments with their peers on the lesson content that their peers had brought to their attention that verbs in green were in *imparfait* and verbs in blue were in *passé composé*. One learner commented “*the activities were interesting; and the blue colour helped me memorize the past participle of irregular verbs like avoir “to have” or pouvoir “to be able to;” and this was good, because I was able to remember the appropriate past participle form of these verbs during the written exams [the immediate and delayed Cloze Tasks] the teacher gave us*”. Learners in other classes made similar comments; other learners added “*it was an interesting and informal way to memorize the conjugation of the imparfait.*”

One learner indicated that during Lesson 4, in which learners read a newspaper article for two minutes and tried to memorize as much as possible from the story, he tried to memorize verbs in blue and verbs in green separately, so he could remember verbs that were in *passé composé* and verbs that required *imparfait* during the reconstruction of the text. The learner said *“I was not able to memorize all verbs, but the verbs I memorized I used them with the correct past in the newspaper article”*. The learner further added, *“the green colour helped me learn how to write imparfait with il “he” singular and ils [the male plural to they] plural, and I remembered this difference in the two tests the teacher has given us after the lab practices [the immediate and delayed cloze task].*

5.2.2 Teachers' Attention to Past Tense

Classroom observations and teachers' weekly reports were used to identify class episodes that would facilitate past tense use in the classroom and potential attention to the appropriate use of the perfective and imperfective. The sections that follow briefly report teachers' practises in the classroom, focussing on potential past tense instruction.

5.2.2.1 Teachers' Weekly Reports

During the implementation of the project, each teacher reported on the focus of 30 regular classroom lessons, of 50 minutes each, in addition to the ten lessons in which the multimedia environment and tests were implemented. As a result, the thematic content of 210 classes was examined. Depending on the class focus, 13 categories were created. One category was grammar; for this category, lesson topics were further subdivided depending on the grammar feature targeted. Lesson topics and grammar features are reported in Table 5.77.

Table 5.77

Distribution of Class Topics in Teachers' Weekly Reports

	Grammar target		Category Counts	
	<i>fr</i>	%	<i>fr</i>	%
Vocabulary			17	8.1%
Grammar			77	36.7%
Adjectives/adverbs	9	4.3%		
Comparatives	1	0.5%		
<i>Conditionnel présent</i>	15	7.1%		
Direct/Indirect OP	1	0.5%		
Gerund	7	3.3%		
Negative pronouns	1	0.5%		
Possessive pronouns	3	1.4%		
Quantifiers	2	1.0%		
Relative pronouns	14	6.7%		
Reported Speech	7	3.3%		
Subjunctive	10	4.8%		
Verbs & prepositions	1	0.5%		
<i>Y</i> and <i>en</i>	6	2.9%		
Pronunciation	1	0.5%	1	0.5%
Speaking			17	8.1%
Listening			3	1.4%
Reading			18	8.6%
Writing (DELF prep)			20	9.5%
Video			1	0.5%
Individual tutorials			1	0.5%
Revision class			16	7.6%
Program discussion			6	2.9%
Missing			8	3.8%
No class			25	11.9%
			210	100%

The analyses revealed that 37% of the lessons that all teachers reported on focussed on grammar features. None of the grammar classes centred upon the teaching of the past tense.

The second most frequent class topic was writing (10% of the reported lessons). Some writing lessons focussed on job application letters describing previous schooling, work experience and training. Other lessons focussed on postcards or vacation letters. Writing lessons were required as part of the training that students received for the French International Examination. Teachers reported that during writing lessons, they avoided focussing on the appropriate use of the past tense, because the main purpose of the task was to help students learn the different writing conventions of letters as required by the international examination, such as the different parts of a job application letter, unfolding of the letter content, formal and informal salutations, and formulaic expressions of politeness. Further, these letters required the use of present and future tenses, for learners to express their expectations from the job, their contributions to the company, etc. Teachers reported that they did not pay attention to these tenses either.

The remaining percentage of classes focussed on the development of reading skills (9%), vocabulary, (8%), or speaking (8%), listening (1%) among other topics presented in Table. 5.77. Teachers indicated no focus on past tense during any of these lessons. However, one teacher reported that, during some lessons, there were occasions in which learners hesitated in their appropriate use of the past tense, due to differences between their use of the past tense and what they had seen in the environment; the teacher indicated that it was a meaningful moment to provide learners with attention to form, but he refrained from doing so, not to bias the results of the study.

Another teacher commented that the multimedia treatment had raised questions with respect to vocabulary, thematic topics and the use of the past tense among learners, who had asked their questions in class. This teacher avoided answering these questions, telling learners that he had not thoroughly worked with the environment and could not remember the sections they were referring to. Other teachers made similar comments.

5.2.2.2 Classroom Observations

Each of the seven participating classes was observed four times during the implementation of the project, to document incidental episodes of attention to past tense during regular classroom instruction. A total of 28 classroom observations of 50 minutes were conducted. Classes were observed one week prior to the treatment (i.e., Week 2), twice during the implementation of the treatment (i.e., Weeks 4 and 5), and once between immediate and delayed post-tests (i.e., Week 8).

Each of the classroom activities in the development of the observed classes was coded using the adapted version of the COLT sheet described in Chapter 4. In total, 118 classroom activities were observed and coded during the 28 classroom visits. After analyzing all classroom activities, 19 categories were established and used to classify the activities documented during the observations. A detailed list of classroom activities and their frequency in the classroom observations is presented in Table 5.78.

Most of the observed activities focussed on oral communication (45%), through whole class or group discussion, pair-work and role-plays. In two of the activities, the oral task facilitated the meaning oriented use of the past tense. The focus of both classes was the distinction between the direct and indirect object pronouns; the teacher provided corrective feedback on these forms only.

Table 5.78

Distribution of Class Activities in Classroom Observations

Class Activity	Counts per Activity		Counts per Category	
	Raw <i>fr</i>	%	Raw <i>fr</i>	%
Vocabulary			11	9%
Presentation	11	9%		
Grammar			19	16%
Presentation	9	8%		
Revision	5	4%		
Mechanical drills	5	4%		
Pronunciation			6	5%
Read aloud	3	3%		
Presentation + Coral Repetition	2	2%		
Tongue-twister	1	1%		
Speaking			53	45%
Class discussion	33	28%		
Pair work	11	9%		
Role-play	5	4%		
Group discussion	3	3%		
Role-play (Class fronted)	1	1%		
Listening			9	8%
Listening for specific information	9	8%		
Reading			4	3%
Group	3	3%		
Individual	1	1%		
Writing			5	4%
Letter writing	4	3%		
Note-taking	1	1%		
Homework			11	9%
Revision	8	7%		
Assignment	3	3%		

Grammar activities ranked in second place and included overt grammar presentation, grammar revision and drills. In all cases teachers focussed on the form, meaning and use of the target grammar feature. None of the grammar activities observed focussed on the perfective and imperfective distinction. Listening (8%), vocabulary (9%) and pronunciation (5%) activities followed in rank.

With respect to writing, five of the observed activities (4%) fell into this category. Two of the activities focussed on the writing of a vacation letter to a friend; two activities focussed on the writing of a job application letter. In all cases, teachers and students worked on the various components of the letters, formulaic expressions to be used, paragraph organization, and punctuation. In one of the sections, learners required the use of past tense to complete the task, but the teacher did not pay attention to this, emphasizing the use of connectors to coherently present the events instead.

The fifth writing activity observed required learners to take notes as the teacher played an audio-recorded dialogue between two friends. The purpose of the activity was to provide learners with some sentences that they would report using reported speech. Past tense in the activity was mostly used with reporting verbs in conjunction with conditional sentences as in *Elle a dit qu'elle irait au cinéma ce-jour là...* "She said that she would go to the cinema that day;" *elle a répondu qu'elle pourrait y aller le lendemain* ... "she answered that she'd be available to go the following day." Teacher feedback focussed on the use of (a) reporting verbs, for instance, ask, tell, answer, wonder; (b) the appropriate use of the conditional inflection: *qu'elle irait*, "that she go+INFLECTION" *que vous iriez* "that you-FORMAL go+INFLECTION"; and (c) temporal adverbials such as *ce-jour là* "on that day," and *le lendemain* "the following day"

5.2.3 Summary of Treatment and Classroom Reports

Data collected through Lesson 1 Log showed that NR learners exposed to Environment E2, which exposed them to past tense beyond their current developmental stage, faced the most challenge during the completion of Lesson 1. In terms of feedback, learners mostly spent time on feedback the first time they encounter it.

In the various Lesson Questionnaires, learners reported interest in the lesson topics and the use of technology; across the four lessons, reports indicated that most learners paid attention to the linguistic forms they were exposed to throughout the various comprehension and production tasks in the environment. Learners further reported that the lessons had helped them in various aspects of their French, including grammar.

Answers in the Input Enhancement Questionnaire indicated that learners had noticed the perfective and imperfective distinction through the colour difference of target verbs. Comments also indicated that colour enhancement had helped learners memorize some of the target verbs and the perfective or imperfective morphology they had appeared with in the environment.

With respect to attention to past tense during regular classroom time, both Teacher Weekly Reports and Classroom Observation reports showed that teachers had not focussed their instructional tasks on the use of the past tense. In the small number of writing tasks and lessons in which past tense was required, teachers did not drive learners' attention to erroneous past tense use. Furthermore, when questions related to the use of the past tense or the environment were brought up by the learners, teachers avoided learners' questions although they thought those moments were meaningful to help learners expand their understanding of the target forms.

5.3 Revisiting the Hypotheses

This study addressed the effects of multimedia instruction on the development of the perfective and imperfective distinction among young-adult university-level classroom learners of French in the foreign language context. During the implementation of the form-focussed multimedia treatment, the impact of two variables on past tense development were examined through a series of past tense tests and through treatment and classroom-based data collection instruments, in order to answer two research questions and test five hypotheses. Answers to the research questions are provided in Chapter 6, leading the discussion of findings. The hypotheses formulated in the study are now revisited in light of the findings.

Hypothesis 1. This hypothesis predicted that form-focussed multimedia instruction on non-prototypical past tense would lead to more target-like use of past tense than form-focussed multimedia instruction on prototypical past. Drawing on the results from the various analyses of variance conducted on the data, hypothesis 1 was rejected.

In the written production task, no differences in past tense use were found between learners exposed to Environment E1 and E2, indicating that learners had equally benefited from both types of past tense instruction. Analyses of past tense score changes showed identical patterns of past tense score evolution over time within NR and RD learners exposed to Environment E1 and Environment E2. These patterns indicated that NR learners from both environments had improved in their use of past tense from pre-test to post-test and that they had maintained their gains; RD learners exhibited significant past tense growth three weeks after the treatment. It should be noted, however, that analyses of the treatment data suggested that Environment E2 had been noticeably

challenging for NR learners and that this environment had produced a sense of learning among the RD group.

Results from the comprehension-based tasks revealed changes in past tense use only between pre-test and delayed post-test, indicating that the treatment had had no immediate impact on learners' performance in these tests.

Hypothesis 2. This hypothesis stated that form-focussed multimedia instruction on non-prototypical past tense among learners who are not ready for non-prototypical past would promote an increase in target-like use of prototypical and non-prototypical past.

Drawing on the past tense test results, this hypothesis was retained. Cloze task results showed that NR learners exposed to E2 exhibited a preference for prototypical over non-prototypical past tense. Results also showed that these learners increased their scores immediately after the treatment and score gains were maintained three weeks after the treatment. Absence of a significant interaction between developmental condition, past type and testing time, however, indicated that E2 NR learners equally benefited in both prototypical and non-prototypical past tense use.

Results from the comprehension-based tasks showed neither immediate nor delayed improvement of non-prototypical past over time.

Hypothesis 3. This hypothesis predicted that form-focussed multimedia instruction on non-prototypical past tense among learners who are ready for non-prototypical past would promote an increase in target-like use of non-prototypical marking. This hypothesis was rejected.

Cloze task baseline data showed that RD learners in E2 showed better use of past tense in prototypical than non-prototypical context prior to the treatment. Analyses of

scores yielded a significant mean increase between pre-test and delayed post-test only, indicating that the treatment had not accelerated past tense use. Absence of an interaction effect between developmental condition, learning environment, past type and testing time, indicated equal evolution of prototypical and non-prototypical past use within testing times.

Results from the comprehension-based instruments showed better use of past tense in prototypical than non-prototypical past tense contexts, but yielded no significant changes between pre-test and immediate post test. No interaction between past type and the other variables was found.

Hypothesis 4. This hypothesis predicted that form-focussed multimedia instruction on prototypical past among learners who are not ready for non-prototypical past would promote an increase in target-like use of prototypical past only. This hypothesis was rejected.

Cloze task results showed that NR learners in E1 exhibited better use of past tense in prototypical than non-prototypical contexts. The analyses of variance revealed past tense changes between pre-test and post-test, but the interaction between developmental condition, learning environment, past type and testing time was not significant, indicating that NR learners exposed to E1 benefited in both prototypical and non-prototypical past.

Results from the situational task did not show any kind of improvement of non-prototypical past over time, but they did show over time improvement in prototypical marking among NR learners. No changes were documented in the appropriate identification of prototypical and non-prototypical past in the listening task score and time reactions.

Hypothesis 5. This hypothesis predicted that form-focussed multimedia instruction on prototypical past will not promote an increase in target-like use of prototypical or non-prototypical past among learners who are ready for non-prototypical past. This hypothesis was rejected.

Cloze task baseline data showed that RD learners exhibited better use of prototypical than non-prototypical past prior to the treatment. Analyses of past tense test results revealed a significant score improvement between pre-test and delayed post-test only. The interaction effect between developmental condition, learning environment, past type and testing time, proved not to be significant, indicating equal increase in prototypical and non-prototypical past use.

Results from the comprehension-based instruments yielded significant changes in the situational task in time reactions between pre-test and delayed post-test, but the absence of interaction between developmental condition, learning environment, testing time and past tense type, suggested no differential effects on past tense type.

5.4 Chapter Summary

To examine the effects of multimedia instruction on L2 grammar acquisition, Chapter 5 presented results from the quantitative and qualitative instruments used during the implementation of two multimedia environments with two groups of learners from different past tense developmental conditions. Results from these instruments led to the retention of two of five hypotheses that were tested through the study. In the next chapter (Chapter 6) explanations for the findings and answers to the research questions will be provided.

CHAPTER 6

DISCUSSION

In this chapter, the results presented in Chapter 5 are discussed and interpreted. Section 6.1 examines results in light of the research questions of the study. Section 6.2 discusses the impact of the treatment on the past tense marking systems of the learners. Section 6.3 focuses on the attention to past tense that the multimedia treatment elicited from learners; the discussion centres upon the potential effects of input enhancement, feedback, and the combined use of video and L2 verbal input on the past tense results. Section 6.4 highlights limitations of the study and future research directions. Finally, Section 6.5 describes the contributions of the study to research on L2 multimedia and instructed SLA.

6.1 Answers to the Research Questions

In this study, two research questions were formulated to investigate the impact of two aspects of multimedia instruction on the development of the perfective and imperfective distinction among classroom instructed learners of French: (a) the type of past tense targeted in the environment (i.e., prototypical and non-prototypical) and (b) learners' readiness to process non-prototypical past (i.e., ready and non-ready).

To address the effects of the type of past tense targeted in the environment, research question 1 (Q1) asked whether form-focussed multimedia instruction on non-prototypical past would be more effective at facilitating past tense improvement than form-focussed multimedia instruction on prototypical past.

In the production task, learners made considerable progress in the use of the past tense over time. Progress was due to the improved use of (a) imperfective and (b) prototypical and non-prototypical marking. Learners made no progress in the written comprehension and reaction time measures at the immediate post-test time. Rather, all learners exhibited changes in comprehension scores seven weeks after the first testing time, indicating that the multimedia treatment had not had an immediate impact on past tense comprehension development. In the listening task, learners made no gains at all over time, suggesting that similarity in pronunciation of perfective and imperfective forms (e.g., *je quittais* /ʒɔ̃kɪtɛ/ “I leave-IMP” and *j’ai quitté* /ʒɛkɪtɛ/ “I leave-PER”) continued being a challenge despite past tense instruction and past tense proficiency increase. In none of the measurements did the type of past tense form-focussed multimedia instruction present in the environment lead to differential effects on past tense improvement. Therefore, the type of multimedia instruction implemented did not make a difference in past tense growth.

To examine the role of learners' readiness to process non-prototypical past during past tense form-focussed multimedia instruction, research question 2 (Q2) asked whether the current past tense developmental condition of L2 learners would mediate the effects of multimedia instruction on past tense improvement.

While the type of past tense targeted in the environment did not have a significant impact on learners' past tense productive growth, learners' readiness to process non-prototypical past mediated L2 gains during multimedia instruction.

In the production task, learners in the lower past tense proficiency group made considerable progress in their appropriate use of past tense during the four-week

treatment and maintained their high achievement three weeks later, suggesting that multimedia instruction had facilitated interlanguage restructuring. The more proficient learners, however, exhibited a significant growth in the appropriate production and in the written comprehension of past tense from pre-test to delayed post-test, suggesting that the multimedia intervention implemented had not been appropriate to accelerate immediate interlanguage changes.

No differential effects for the interaction between developmental condition and past tense obtained on any of the comprehension-based tests, indicating that developmental condition had no impact on comprehension changes.

In summary, form-focussed multimedia instruction that targeted the prototypical past was equally effective at promoting productive past tense growth as form-focussed instruction on non-prototypical past. However, the point of past tense marking development at which learners received exposure to multimedia treatment mediated L2 productive gains. The following sections discuss developmental and instructional factors that appear to have contributed to these results.

6.2 Multimedia Effects on Past Tense Development

“Multimedia represents a potentially powerful learning technology – that is, a system for enhancing human learning” (Mayer, 2005, p.7). Mayer (2005) indicates that, to examine the effects of multimedia instruction on learning, it is necessary to consider the manner in which people construct knowledge and the manner in which people's interaction with multimedia can foster conditions for knowledge construction. Results from investigations built upon these considerations benefit the sound design and

educational implementation of multimedia environments. Drawing on these indications, two assumptions in the design of the current multimedia-based L2 grammar study were that learners proceed through the acquisition of the past tense operating on a series of developmental stages, and, second, that learners' advancement through these stages can be facilitated using form-focussed multimedia.

The framework used to analyze the impact of multimedia on past tense improvement was built upon patterns of past tense development predicted by the aspect hypothesis proposed by Andersen and Shirai (Andersen, 2002; Andersen & Shirai, 1994). Evidence presented in Chapter 3 showed that, in line with predictions of the aspect hypothesis, classroom-instructed learners of French attempt the productive use of the imperfective once perfective has emerged and that perfective and imperfective markers emerge in prototypical contexts and, then, gradually spread through non-prototypical contexts. The manner in which the instructional intervention appeared to have assisted learners' advancement through these predicted stages of development is examined in the two following sections.

The data collected throughout the experiment do not allow for conjectures about the impact of instruction on past tense emergence, because at the time of the experiment both grammatical aspects had already emerged in prototypical and non-prototypical contexts. The data do allow for a discussion of the effects of instruction on the rates of appropriate use of past tense marking, however. Overall, results showed that past tense rate growth remained congruent with the patterns of past tense evolution predicted by the aspect hypothesis, suggesting that the effects of multimedia instruction had operated within the developmental processes that characterize past tense acquisition.

6.2.1 Effects on the Development of Grammatical Aspect

Congruent with findings in previous tense-aspect research (e.g., Harley, 1992; Kaplan, 1987) and predictions of the aspect hypothesis, prior to the treatment, all learners exhibited larger rates of appropriate marking with perfective than with imperfective. Better use of perfective than imperfective was particularly predominant in the written production and reaction times of the learners, suggesting systematicity in this differential use of grammatical aspect in the interlanguage systems of the learners. It appears, however, that with the increase of proficiency, advanced Hispanophone learners of French were able to override this differential use in their production, since, at the pre-test time, RD learners had already reached equal level of control over perfective and imperfective forms, whereas NR learners still showed better use of past tense in perfective than imperfective contexts.

This finding lends further support to the facilitative effects of L1 influence in the acquisition of past tense marking. Investigations into the development of past tense among instructed learners of French have revealed that more advanced learners without imperfective in their L1 continue operating on a perfective preference in comparison to native speakers of French, despite the increase of past tense proficiency (e.g., Harley, 1992; Harley & Swain, 1978; Salaberry, 1998). Evidence collected in the current study and previous research (Izquierdo, 2006; Izquierdo & Collins, in press) shows, however, that Hispanophone learners of French, who do mark the perfective and imperfective distinction in their L1, reach a developmental stage in which they are able to override the perfective preference.

After the instructional intervention, the appropriate productive use of imperfective had doubled from pre-test to immediate post-test among NR participants and gains were maintained three weeks after the treatment result. The appropriate productive use of perfective showed no evolution, however. Among the more proficient past tense group (i.e., RD learners), the form-focussed multimedia intervention did not immediately benefit the productive use of perfective or imperfective past. Further, the multimedia treatment did not assist comprehension development in any of the tasks. This finding indicates that the multimedia treatment had been effective to facilitate interlanguage development only at the production level with one grammatical aspect and within the least past tense proficient group (i.e., NR learners).

It appears that, although both multimedia environments provided learners with equal exposure to the form-focussed use of perfective and imperfective markers in listening, reading and writing tasks, the effects of the multimedia instruction on past tense production had been mediated, not only by past tense proficiency, but also by grammatical aspect. One likely explanation for the absence of productive perfective growth within both developmental groups relates to the high scores that all learners achieved across testing times in the cloze task, and which may have caused a ceiling effect (this issue will be further addressed in the limitation section).

Within a developmental framework, one potential interpretation of imperfective growth only among NR learners is that at the time of the implementation of the multimedia treatment, these learners had already attained sufficient control over perfective past and were ready to advance their imperfective use. Indeed, NR learners showed similar level of control over perfective as their RD counterparts, but were far

behind in their ability to appropriately identify imperfective contexts. Multimedia exposure then appears to have provided NR learners with the appropriate learning conditions that they needed to restructure their interlanguage systems, promoting advancement in the grammatical aspect that they were ready to develop.

In the tense and aspect literature, Ayoun (2001, 2004) also found disproportional perfective and imperfective rate growth resulting from instruction. In her study, learners of French who did not have control over perfective and imperfective forms prior to a computerized treatment mostly benefited from instruction in the development of perfective, despite exposure to both grammatical aspect forms. Learners showed some gains with respect to imperfective, mostly with a reduced number of stative verbs. The development of perfective and imperfective markers in these two studies are congruent with the aspect hypothesis and previous observational studies on past tense development and suggest that instruction that provides learners with natural or balanced opportunities to encounter both grammatical aspects facilitates imperfective rate development after growth of perfective past (for a discussion of the impact of instruction on tense aspect emergence, see Blyth, 2005).

With respect to the absence of improvement in the productive use of grammatical aspect that the more past tense proficient learners experienced immediately after the treatment, it has to be noted that these participants had already attained high and equal level of control over both grammatical aspects prior to the treatment.

Evidence provided in Chapter 3 suggests that growth in perfective and imperfective may depend on the degree of control that learners gradually achieve over the differential number of perfective and imperfective values and on the degree to which

learners are able to use these values to override lexical aspect. Although it was not possible to control the occurrence of the perfective and imperfective values in the multimedia treatment, efforts were made to create contexts in which learners would receive sufficient exposure to the perfective and imperfective functional values highlighted in Chapter 3. However, RD learners' perfective and imperfective scores suggest that these learners had gained control over the differential number of functional values of each grammatical aspect prior to the treatment and, therefore, the exposure to the various values of perfective and imperfective past tense was no longer needed. Rather, as the following sections discuss, RD learners were in need of longer and less implicit exposure to the use of perfective and imperfective in the least prototypical contexts.

6.2.2 Effects on the Development of Prototypical and Non-prototypical Past

Prior to the treatment, all participants demonstrated better use of past tense in prototypical than in non-prototypical contexts. Irrespective of developmental condition, this use of past tense was particularly predominant in learners' written production, listening comprehension and reaction times, but not in written comprehension. Contrary to the hypotheses formulated in the study, neither form-focussed multimedia instruction on prototypical nor form-focussed multimedia instruction on non-prototypical past altered the better use of past tense in prototypical contexts.

These results suggest that lexical aspect constitutes a major challenge in the past tense production of learners' of French, irrespective of past tense proficiency knowledge and L1 background, and that lexical aspect may remain operative despite focussed and sustained instruction on the use of past tense functional values to override verb semantics.

Results suggest, however, that form-focussed multimedia instruction on both grammatical aspects, irrespective of the past tense context type in which grammatical aspect appears (i.e., prototypical or non-prototypical), can be used to accelerate the productive use of past in prototypical and non-prototypical contexts among less proficient past tense learners.

Results from the current study suggest that through exposure to both grammatical aspects, less advanced learners obtained past tense knowledge that they were able to generalize to past tense forms that were absent in the environment. That is, from Environment E1 (i.e., multimedia instruction on prototypical past), learners gained past tense knowledge that facilitated an increase in the use of the forms present in the environment and set foundations for the development of more difficult types (i.e., non-prototypical past). Less proficient learners exposed to Environment E2 (i.e., multimedia instruction on non-prototypical past), on the other hand, gained past tense knowledge that promoted interlanguage restructuring with respect to the use of the forms present in the environment, but also with less difficult past tense forms (i.e., prototypical past).

Although studies looking at the acquisition of relative clauses in English have provided evidence to support that L2 instruction may foster knowledge generalization to forms which are less and more complex than the ones present in the instructional materials (e.g., Ammar & Lightbown, 2005; Doughty, 1991), the same statement cannot be made with respect to the impact of form-focussed multimedia instruction on past tense development, because various variables appear to have interacted in the current study, contributing to prototypical and non-prototypical past development.

The first variable that could have operated on equal development of prototypical and non-prototypical past is the past tense knowledge that learners had attained prior to the treatment. By the time of the instruction, NR learners demonstrated sufficient knowledge to identify more than half of the prototypical and non-prototypical contexts, indicating that learners were already at a post-emergent stage with respect to both prototypical and non-prototypical past. This knowledge may have then operated with the rich form-focussed exposure to past tense that learners received, helping them extend their use of past tense across verb types.

The second variable is the use of prototypical and non-prototypical marking that the written production tasks appeared to have facilitated across all four lessons. Although the language exposure that learners obtained from the environment was limited to their respective past tense experimental condition, learners' responses throughout the treatment materials suggest that the meaning-oriented use of the targeted past tense in the form-focussed written production tasks pushed learners to produce prototypical and non-prototypical past tense to create coherent narratives. Although the use rate of these two past tense types was not established during the data analyses process and may have varied depending on the experimental condition of the learners, learners in both environments appear to have had opportunities to increase their understanding of past tense in prototypical and non-prototypical contexts through the productive tasks.

The third variable that may have contributed to equal increase of prototypical and non-prototypical past was L1 influence. During the implementation of the treatment, it was observed that the focussed and sustained attention that learners received from the multimedia treatment promoted noticing and language awareness with respect to

similarities in form-function mapping between Spanish and French. This awareness may have facilitated L1 and L2 form/function mapping in prototypical and non-prototypical contexts, promoting the development of past tense marking in both contexts (for further evidence on the benefit of L1-L2 awareness in form-focussed instruction, see Simard, 2007; Spada et al., 2005).

Nonetheless, in light of the positive L2 learning conditions that were created through the instructional environments, the question as to why more advanced learners did not benefit immediately from the multimedia treatment still remains. It is clear from the data used to provide the explanations below that a ceiling effect and the number of participants in the most advanced experimental groups had an impact on the absence of significant differences between the prototypical and non-prototypical past tense scores that learners obtained throughout testing times.

In addition to this statistical limitation, one potential explanation for the absence of immediate past tense growth among more advanced learners is that they had reached a developmental point at which growth of their tense-aspect system required longer exposure to form-focussed instruction on non-prototypical past. The general scores of appropriate past tense in the production tasks suggested that, although the past tense treatment type did not lead to a significant differential growth between more advanced learners exposed to Environment E1 and E2, at the time the treatment ceased, learners exposed to non-prototypical were responding more positively to the form-focussed multimedia treatment than their counterparts who were receiving exposure to prototypical past only. In addition, the results suggested that treatment interruption stopped past tense

progress among learners exposed to E2, allowing learners in E1 to catch up three weeks later.

Further evidence for the need of non-prototypical past instruction with more advanced learners comes from learners' motivation and interest to complete the study. At the pre-test time, equal numbers of RD participants were assigned to both experimental conditions, but only all RD learners in Environment E2 completed the study. Among learners in Environment E1, one of the participants was excluded from the study, because his data in one of the computerized test were lost. Yet, the other four learners dropped out throughout the implementation of Lessons 1 through 3; comments that these learners made to the researcher indicated that their decision to drop out from the study was due to absence of learning challenge in the prototypical marking condition.

One of the learners assigned to E1 commented, for instance, *"See, I really like the software activities; they are entertaining and I get to practice a lot of French, but they are all in past and I already know past tense."* This comment, contrasts with the comment presented in Chapter 5 from one of the RD participants in E2: *"the activities were interesting; and the blue colour helped me memorize the past participle of irregular verbs like avoir "to have" or pouvoir "to be able to;" and this was good, because I was able to remember the appropriate past participle form of these verbs during the written exams [the immediate and delayed Cloze Tasks] the teacher gave us"*. Differences between these learners' comments indicate that non-prototypical instruction provided more-advanced learners with a sense of learning, which contributed to encourage their work with multimedia. Further evidence on the effectiveness of non-prototypical past

among more advanced learners will be provided through the discussion of learners' responses to the multimedia treatment.

One interesting finding with respect to the effects of multimedia on learners' appropriate use of past tense was that none of the developmental groups improved in their ability to appropriately identify prototypical and non-prototypical contexts in the listening task and that both groups were faster at providing correct answers with prototypical than non-prototypical contexts. One interpretation of this finding is that with the increase of proficiency and exposure to instruction, learners' written production and written comprehension of grammatical aspect improve, but Hispanophone learners of French continue facing the same degree of challenge with respect to the discrimination of perfective and imperfective forms in contexts where grammatical aspect is not phonologically salient and learners cannot rely on discourse elements to differentiate perfective from imperfective events. This finding lends support to the argument that phonological similarities between French forms may prevent learners from noticing the differential use of grammatical aspects in the L2 oral input (Harley, 1986; Lyster, 2007). This, in turn, may increase learners' dependence on discourse elements such as temporal adverbials during the acquisition of tense-aspect (for further evidence on learners' dependence on temporal adverbials to acquire aspect, see Abrate, 1983; Izquierdo & Collins, in press).

One further interpretation of this finding is that lexical aspect may act as an input filter in the acquisition of tense and grammatical aspect, when learners are not able to distinguish grammatical aspect in the aural input. This potential role of lexical aspect to filter L2 input raises two interrelated challenges for the acquisition of tense and

grammatical aspect in French. First, lexical aspect may prevent learners from noticing the non-prototypical use of past tense in the aural input, and second, if lexical aspect leads learners to filter past tense on prototypical bases, this filtering process feeds learners' interlanguage systems with misleading representations of past tense marking in the L2, increasing their dependence on prototypical past (for further evidence on learners not noticing non-prototypical forms from the L2 input, see Collins, 2005; Izquierdo & Collins, in press).

In summary, results from the past tense data suggest that the multimedia instruction that was implemented to provide Hispanophone learners of French with rich exposure to the form-focussed use of perfective and imperfective forms increased the rates, but did not alter the distribution of the perfective and imperfective forms that had emerged in the interlanguage systems of learners prior to the experiment. The degree to which form-focussed multimedia instruction caused this acceleration seems to have depended on learners' readiness to develop grammatical aspect, and suggests that once they have reached an advanced developmental point in the acquisition of past tense learners are in need of long-term exposure to form-focussed instruction on non-prototypical past to continue advancing their interlanguage systems. As the following sections will show, this type of form-focussed instruction may need to include less implicit tasks than the ones that were administered in this study.

6.3. Learners' Attention to Form during Multimedia Past Tense Instruction

This study built upon the argument that environments which integrate different media to provide learners with rich and motivating contexts for the meaning-oriented use

of the L2 and systematically drive learners' attention to target grammatical features could help learners build their knowledge of the form/meaning connections that underpin the use of the L2. This knowledge could, in turn, promote learners' advancement through the processes that underpin the acquisition of the targeted L2 grammar structures.

In the current study, conditions for attention to form that could promote language noticing and awareness were fostered through production and comprehension-based tasks. Although this integrative approach impedes the identification of the multimedia form-focussed features that may have led to L2 learning in the current study, data collected during participants' interaction with the environment provide evidence on the manner in which learners reacted to the diversified form-focussed opportunities that they encountered. In the following sections, the manner in which three aspects of the multimedia treatment contributed to push learners to attend to form is discussed: input enhancement, feedback, and the combined use of video and L2 verbal input.

6.3.1 Attention to Form through Input Enhancement

The systematicity with which input enhancement appeared across all lessons and the consistency maintained in the visual differentiation between perfective and imperfective forms seem to have promoted saliency and identification of the L2 grammar targeted in multimedia instruction. Learners' comments and use of past tense morphology in the written production tests suggest that this systematicity and consistency promoted learning of morphological and syntactic aspects of perfective and imperfective, for instance. This finding on the beneficial effects of input enhancement to promote perceptual saliency of the L2 input is consistent with previous multimedia research results (e.g., Brett, 1998, 2000), and highlights the value of this multimedia feature to

drive learners' attention to form, particularly in multimedia-based comprehension tasks where the highly meaning-oriented nature of the tasks and/or the media itself can distract learners' focal attention from language, decreasing the effectiveness of the instructional tasks to facilitate L2 acquisition.

SLA researchers have pointed out that L2 noticing resulting from the perceptual saliency promoted through input enhancement does not necessarily entail L2 grammar knowledge, however (Schmidt, 2001; White, 1998). Simard (under review) has further argued that the degree of attention that results from this type of form-focussed instructional procedure may depend on the complexity of the targeted grammar forms. Congruent with these arguments, in the particular case of the teaching of the perfective and imperfective distinction with multimedia, the manner in which input enhancement was integrated in the experimental environments may not have necessarily promoted awareness of differential past tense use in prototypical and non-prototypical contexts, but, rather noticing of surface aspects of past tense marking (e.g., endings, auxiliary agreement); this would in turn explain learners' apparent morphological and syntactic improvement.

The experimental design of the study led learners to encounter past tense in either prototypical or non-prototypical contexts. It was expected that input enhancement in the non-prototypical past environment would help learners notice the use of perfective and imperfective in these types of contexts and that learners would then intuitively compare these forms with the ones available in their interlanguage systems, becoming aware of differences. However, input enhancement could have been more effective at facilitating awareness of prototypical and non-prototypical past if it had provided learners with the

opportunity to visually contrast the use of past tense markers in prototypical and non-prototypical contexts throughout the narratives.

However, this type of input enhancement would have required that learners be exposed to prototypical and non-prototypical past, contradicting the conditions that were of interest for the study. Drawing on the results that were obtained with RD participants in E2, it could be hypothesized, for instance, that awareness resulting from the use of input enhancement to help learners contrast past tense in prototypical and non-prototypical past tense contexts could have increased the performance of RD learners assigned to E2 performance immediately after the treatment, contributing to statistical support for immediate past tense growth after the treatment.

6.3.2 Attention to Form through Feedback

Chapelle (2001) and Plass and Jones (2005) have pointed out the need for experimental research to investigate pedagogical procedures that promote noticing and awareness conditions during meaning-oriented production tasks. Drawing on instructed SLA research, different types of feedback techniques that are known to promote negotiation of form in classroom contexts were integrated into the environments: metalinguistic prompts (e.g., Lyster, 2001; Lyster & Ranta, 1997; Panova & Lyster, 2002) and peer collaboration (e.g., Alegría de la Colina & García-Mayo, 2006; Swain, 1998); computer-facilitated self-correction was also promoted.

Evidence collected during the treatment implementation suggests that negotiation of form is amenable to multimedia environments tasks and facilitates learners' attention to L2 grammar features. Since none of the feedback procedures was used in an isolated and systematic manner in the environments, the degree to which all these procedures may

have contributed to past tense growth cannot be determined. Yet, learners' performance during the multimedia-based tasks permits one to make conjectures as to how the feedback procedures may have drawn learners' attention to form.

With respect to the integration of metalinguistic prompts in the scrambled sentence task, analyses of learners' patterns of interaction with the computer during Lesson 1 revealed different factors, contributing to the attention that learners paid to this type of feedback. One factor that seems to have positively influenced learners' attention to form was the directness of metalinguistic prompts to indicate aspects of the L2 outcome to which learners need to attend, and the opportunity that prompts provide learners to figure out correctness. Analyses of the time that learners spent on the metalinguistic prompts revealed that learners attended to prompts only the first three times that they received feedback. One potential interpretation of this finding is that learners became aware of the purpose of the feedback and, thus, were no longer interested in reading the prompts and tried to figure out the answers to the task on their own.

One additional interpretation could be that learners became aware of the purpose of the feedback through the first three sets of prompts and, thus, knew the elements on which they needed to focus their attention during the process of correction. Evidence to support this interpretation can be found in learners' responses to the retrospective questionnaires and the rates of correct repairs from Log 1. In the questionnaires, most learners reported that after exposure to the prompts, they returned to the sentences and either read at a word-by-word level or paid attention to the inflection in the verbs. This finding suggests that after receiving feedback for the first time, learners had been able to focus their attention, increasing their possibility to find the correct answer.

One other factor that appeared to have positively contributed to attention in this task was the combined use of prompts and input enhancement. At this point, the reader is reminded that after receiving feedback, learners returned to the scrambled sentences, in order to make a new sentence selection and that input enhancement was used in these sentences to make the target features perceptually salient. Therefore, metalinguistic prompts may have acted in combination with input enhancement, helping learners to direct their attention to the target features in an efficient fashion. That is, the metalinguistic prompts directed learners' attention to the language features that were key elements for the completion of the task, and, as learners were exposed to all the sentences again, input enhancement made salient the language forms that needed to be targeted, helping learners identify what they needed from the linguistic input.

It is interesting to note that analyses of error frequency of NR learners assigned to the prototypical environment and non-prototypical environments indicated that non-ready learners were more challenged by the completion of the task in the non-prototypical environment than in the prototypical environment. Yet, analyses of the time that learners spent on prompts and the total number of correct answers did not yield significant differences between experimental groups, pointing to equal degree of attention through the correction process in the task, with the exception of the delayed repairs made by the least proficient learners exposed to forms beyond their current developmental stage.

These findings with respect to the degree of attention that participants paid during the correction process in their respective environments lend further support to the arguments made in previous research for the need of integrating corrective feedback procedures in multimedia applications instruction. Results from the current study suggest

that corrective feedback that pushes learners to correct themselves (i.e., prompts, Lyster, 2004a) could be an effective instructional feature to draw learners' attention to form in multimedia environments, where the meaning-oriented and media-distracting nature of the instructional tasks can reduce learners' attention to form (for further discussion on the benefit of using prompts in highly meaning-oriented contexts, see the counterbalance hypothesis, Lyster & Mori, 2006).

Edwards and his colleagues (Edwards et al., 2000; Edwards *et al.*, 2002) have pointed out the potential of multimedia to facilitate freer production in which learners could have opportunities to attend to language during interactional tasks. Drawing on previous classroom-based research (e.g., Alegría de la Colina & García-Mayo, 2006; Swain, 1998), these opportunities were fostered in the current experimental environments through production tasks in which learners could obtain feedback from their peers (Lesson 2 and 4) or in which learners could make explicit contrast between their production and computer texts (i.e., computer facilitated self-correction), as in Lesson 4.

Observations conducted in the computer lab revealed that peer interaction facilitated feedback that helped learners contrast interlanguage and L2 forms and build L1-L2 form-function mapping¹⁷. With respect to peer feedback leading to contrasts between interlanguage and L2 forms, it was noted during the reconstruction of the listening task, for instance, that one learner had used prototypical marking with the verb *tomber* “to fall” (i.e., *tomber* with perfective) in an obligatory context for non-prototypical past (i.e., *tomber* with imperfective). Then, during the collaborative reconstruction of the text, the peer indicated that, instead of perfective, *tomber* required

¹⁷ It should be noted, however, that learners were mostly observed negotiating the morphological and syntactic aspects of past tense and vocabulary.

the use of *imparfait*. In response to his peer's feedback, the learner said: *oh, can you use imparfait with this verb?*¹⁸ Similar situations were observed among other learners.

Peers were also observed providing feedback on past tense use associating L1-L2 form-function mapping. One learner was observed, for instance, correcting his peer in the following way: *You need imparfait here, see, it's like in Spanish, la nieve caía* “the snow fall-IMP.” On the one hand, evidence from these corrective feedback episodes suggests that learners who mark the perfective and imperfective distinction in their L1 are influenced by verb semantics when they need to mark aspect in their L2, and that explicit L1-L2 associations may not always occur, lending further support to the limited benefit of L1 influence in L2 acquisition (Izquierdo, 2006; Izquierdo & Collins, in press). On the other hand, the performance of the learner who produced the error suggests that he had not noticed the non-prototypical use of the targeted verb in the environment prior to their peer's feedback. This interpretation lends further support to argue that input enhancement as it was provided in the environment was not sufficient to help learners become aware of the non-prototypical use of past tense.

These findings with respect to learners negotiating form during multimedia-based output are consistent with reports presented by Edwards and his colleagues (Edwards et al., 2000; Edwards et al., 2002), and highlight the potential use of multimedia to create output contexts where learners can draw on their own linguistic resources (e.g., knowledge of the L2 or of L1-L2 similarities/differences) to test hypotheses as to how the L2 works through peer collaboration. Certainly, as Ranta and Lyster (2007) have pointed

¹⁸ It is regrettable that learners were not recorded during the production tasks; recordings would have permitted the examination of language-related episodes and the focus of these episodes, helping determine the frequency with which negotiation of non-prototypical marking occurred.

out, the effects of this type of collaborative procedure on interlanguage restructuring remains to be examined.

6.3.3 Highlights of the Video-based Lesson

In a previous section of this chapter, it was indicated that the follow-up production tasks elicited the use of prototypical and non-prototypical past among learners assigned to either past tense experimental condition. Learners' use of past tense markers after exposure to the true-false video-based task suggest that, in addition to high levels of interest and motivation, the video-based lesson had promoted past tense use in the condition to which learners had been exposed¹⁹.

The writing samples from the video-lesson presented on next page come from two learners classified as non-developmentally ready. Only the first six lines are presented for illustration purposes, the patterns of past tense were somewhat consistent throughout the text. Verbs that learners were requested to include in their narrative are underlined; verbs that learners included on their own are in bold (the reader is reminded that the instructions and work sheets for this task are presented in Appendix F).

The samples differ in that the narrative of the learner exposed to Environment E1 (i.e., multimedia instruction on prototypical past) includes exclusively prototypical past, while the narrative of the learner exposed to E2 (i.e., multimedia instruction on non-prototypical past) shows frequent attempts of past tense in non-prototypical contexts in addition to the cases that were required by the task.

¹⁹ Learners' narratives also suggest use of vocabulary that learners encountered in the environment, and which may have been unknown to them prior to multimedia exposure.

Example 6.1

Production sample from a NR learner in E1 during Lesson 3

*La motocyclette rose: Dans le jardin de la Panthère Rose avait de déchets et la panthère **a pris un roue** et **mis à** sa motocyclette et après la panthère **conduisait** dans son jardin mais la motocyclette **était** très fragile et **s'est brisée**. La panthère **a mis** une pièce de caoutchouc et la panthère **a ensuite démarré** la Motocyclette et après la panthère **circulait** dans la rue sans pouvoir contrôler la motocyclette et **semblait** très inquiète...*

Example 6.2

Production sample from a NR learner in E2 during Lesson 3

*La Panthère rose a eu un problème avec son parapluie pendant **tombait** la pluie. Elle n'a pas pu s'est protégé de la tempête alors a vu un panneau que dit "Dead Dog" La Panthère rose a trove à l'hôtel, elle a semblé contente depuis qu'elle **a regardé** dans le vestibule. On l'hotel **a eu un fantasma** mais la panthère n'a pas vu, quand elle a ouvert la porte de la chambre un vent fort **entrait** pour la fenêtre, depuis a vu un feuteuil devant de la porte, **elle sortiat le fauteuil** mais...*

Further, the non-prototypical use of past tense in the written film-retelling narrative of this learner, classified as non-developmentally ready, contrasts with the use of past tense that has been continuously elicited among less proficient L2 learners through written film-retelling narratives in previous investigations into the development of past tense marking in French and other L2s (for a review of these studies, see Bardovi-Harlig, 2000). The reader is reminded that analyses of learners' use of past tense marking

in these studies have shown that once prototypical and non-prototypical marking have emerged, their rate in learners' narratives increases with proficiency, but the preference for the use of prototypical past does not change. However, the extract of the learner exposed to E2 shows almost equal amounts of prototypical and non-prototypical past.

One interpretation of the unusual use of non-prototypical past exhibited by this learner (and others exposed to E2) is that the video-based multimedia lesson had primed this learner's perception of the events presented in the video story and provided him with the linguistic resources required to express the perceived events; this, in turn, facilitated the productive use of past tense as encountered in the environment. The manner in which images and verbal language can be integrated to facilitate attention to and acquisition of L2 grammar is an area of CALL research that is yet to be explored (for a discussion of this issue, see Petrie, 2005). Yet, theoretical support to explain the priming effects of the lesson to facilitate non-prototypical past production in the written narratives can be found in the cognitive load theory that has set the foundation of various multimedia studies (for a recent article on the implications of the cognitive load theory for multimedia learning, see Sweller, 2005).

The cognitive load theory proposes that the human capacity to learn through the working memory is limited and, thus, dependent on the amount of cognitive load imposed by the learning task (Sweller, 2005). Operating on this tenant with respect to L2 grammar learning from multimedia, for instance, exposing L2 learners to a video story with subtitles that narrate the story plot can be hypothesized to overload learners' attention capacities, as learners need to simultaneously interpret the story plot from written language and from the motion picture. Under this cognitive demand, learners

may choose to disregard one input choice, in order to better focus their attention and to be able to focus their attention on meaning (i.e., the story content); thus, this presentation of verbal and non-verbal visual input may not be efficient to facilitate intake of L2 forms, as learners may focus their attention on the motion picture, rather than on the L2 sentences, having little chance to notice the L2 forms with which the story is encoded (for further discussion on the detrimental effects of simultaneously presenting video and textual information on L2 learners' comprehension, see Ariew & Ercetin, 2004; Chun & Plass, 1997).

However, during video-based L2 narratives, it can be hypothesized that a more effective way to facilitate learning of content and of the language forms with which such a content is encoded is through exposure to the video story and the written narrative at different times; this is because learners can decode information from verbal and pictorial input at different times and, then, focus their attention on integrating all information obtained, potentially mapping linguistic and non-linguistic input.

Since the video lesson was designed following this latter format, learners' attention was alternated from linguistic to visual input. Linguistic input was provided through sentences that learners decoded prior to watching each of the eight video segments that built up the complete video story. In combination with input enhancement, the sentences that learners read prior to watching the video may have made the targeted events stand out from the rest of the story plot. The use of grammatical aspect in these sentences provided learners with an initial understanding of how the sentences were occurring in the video lesson, shaping learners' initial conceptualization of the events; recall that all learners demonstrated notions of the perfective and imperfective distinction

at the pre-test time, and therefore, they already had some understanding of how actions were to be perceived when perfective or imperfective were used.

In most of the sentences of the video-based task, there was congruence between the manner in which the actions were described through grammatical aspect and the manner in which the events unfolded in video story. Therefore, the video story could have reinforced learners' perception of the events as they had been presented through grammatical aspect. Since sentences and the video story were presented in segments, learners had time to store in their mind events from the video story and the language that could be used to encode them; it should be noted that the interest and motivation that the video-lesson raised among participants might have played an important role during this information storage. Then, the production task provided learners with an opportunity to put together the verbal and non-verbal information that they had stored (for further discussion on how the learning of aspect can be facilitated through video stories, see Blyth, 2005)

Given the positive impact that the video lesson appears to have had on non-prototypical aspect marking on the production of learners exposed to E2, the question that remains is why the past tense growth of learners exposed to this environment did not differ from learners exposed to E1. One explanation is that learners had intensive exposure to this type of video-based 'past tense shaping task' during one lesson only, and one lesson was not sufficient to lead to interlanguage changes.

Another explanation is that the treatment may have facilitated the learning of non-prototypical items, rather than learning of the non-prototypical system. Evidence for item, rather than system learning has been reported in previous research investigating the

effects of form-focussed instruction on L2 grammar development in classroom settings. Harley (1998) investigated the impact of instruction on the learning of gender in French among Grade 2 immersion children and found that participants appeared to have learnt the gender of the French nouns presented in the experimental materials, but they seemed not to have been able to generalize their gained knowledge of gender to other nouns.

While Harley's participants were all young learners and may not have developed sufficient analytical skills to generalize from item to system learning, it is interesting to see that participants in the current multimedia study seem not to have been able to make generalizations of the past tense system in non-prototypical contexts despite the analytic skills that they may have developed through age and the instruction. In the case of less proficient past tense learners, one potential explanation could be that they were not developmentally ready to make such generalizations. But this explanation does not address why more advanced learners who already had more knowledge of non-prototypical past did not benefit from the treatment.

One potential explanation to this is that learners' new knowledge of the tense-aspect system may have been associated with the learning tasks and past tense situational topics to which they were exposed to through the multimedia treatment. Since the testing tasks and situational topics varied from those presented in the treatment, learners' might have not been able to reproduce/transfer their use of non-prototypical past to these contexts.

Evidence for this argument comes from the manner in which learners assigned to Environment E2 appeared to have used non-prototypical past in the treatment materials of Lessons 3 and 4. In these two lessons learners were exposed to the same past tense

contexts and situations. Recall that these two lessons were related and built upon the same video story; more precisely, in Lesson 3 learners watched the Pink Panther video with the true-false sentences and then produced a written narrative; in Lesson 4 learners worked again on the writing of the same video story in the same past tense contexts, but this time, the writing task was presented in the form of a cloze task contextualized within a newspaper article-writing situation.

La Presse Humoristique de Montréal

Montréal, Québec



Chers lecteurs, maintenant nous présentons des aventures de Monsieur Panthère Rose pendant il était en Arizona la semaine passée. ses vacances en

Le week-end dernier, Monsieur Rose s'est perdu au milieu de désert en Arizona. Une pluie torrentielle nevenait pas de tomber. Seule au milieu du désert, la Panthère avait pas de refuge. Après un certain temps, dans un village perdu dans le désert, elle avait se protéger de l'orage dans un hôtel. La Panthère y a une nuit difficile!

D'abord, pendant qu'elle se registrait à la réception, la Panthère a vu choses bizarres avec un stylo. Plus tard dans la nuit, elle a combattu deux êtres surnaturels. Un squelette et un fantôme ont essayé de la terrifier, mais elle a été capable de s'échapper d'eux: si elle s'échappait du fantôme et du squelette, ils la retrouvaient

Dans l'hôtel (le combat) la Panthère, le fantôme et le squelette ne trouvent seulement pas que le bruit qui venait de l'hôtel réveillait les gens du village. Au lever du jour, la Panthère allait prison sans comprendre que le village disparaissait. Finalement, la Panthère n'a jamais su qu'elle avait été dans un village fantôme.

Figure 6.1 Use of grammatical aspect in Lesson 4 materials

Figure 6.1 illustrates the use of grammatical aspect with verbal predicates in the newspaper-writing task by a learner exposed to the non-prototypical environment. The circles highlight wrong choices of grammatical aspect and the corrections that learners made. The figure shows that the learner had not only been able to remember most of the verbal predicates that were required for the completion of the narrative, but also that he

had made a very small number of wrong grammatical aspect choices in a task that required the production of the most complex past tense forms (i.e., non-prototypical past). It should be noted that the all verbal predicates that were required for the completion of this task in Lesson 4 had appeared in Lesson 3, one week before, during the presentation of the video story in the same story and that this learner had also used most of these predicates during Lesson 3 production task.

The use of tense-aspect markers that this RD participant exhibited across Lessons 3 and 4 suggests that the learner had certainly retained the story and the linguistic elements that were needed to encode it, and that he was able to use non-prototypical past in the same context eight days later. However, production test results indicated that this learner, similarly to his RD peers exposed to non-prototypical past, had made no significant progress in non-prototypical past tense use immediately after the treatment, suggesting that he had not been able to transfer the use of non-prototypical past to situations outside the contexts in Lesson 3 and 4.

In summary, different variables seem to have affected the effectiveness of the various form-focussed multimedia features that were integrated in the environment. Input enhancement appears to have been an effective procedure to make salient the target linguistic features and to help learners attend to surface aspects of the past tense (i.e., morphology and syntax); yet, it did not provide learners with opportunities to become aware of past tense markers in prototypical and non-prototypical past.

Prompts in the experimental environments appeared to have facilitated attention to form, helping learners focus on the target language and providing them with opportunities for self-repair in a context where the meaning and media-based nature of

the instructional task may have refrained learners from attending to form otherwise. Factors such as the developmental readiness and the challenge imposed by the instructional task seemed to have mediated attention to the multimedia task in which this type of corrective feedback was implemented, however.

The multimedia-facilitated output tasks provided learners with opportunities to also focus on various aspects of the L2 through peer collaboration; yet, the unsystematic manner with which learners attended to past tense during these tasks may have decreased opportunities for interlanguage changes.

The video lesson appeared to have provided learners with rich opportunities to attend to and retain the target features. Yet, whether learners became aware of the system that underpinned the use of the target language and are able to transfer the knowledge that they gained during this task to other contexts remains to be investigated.

Since the treatment provided learners with opportunities to encounter prototypical or non-prototypical past tense only, these procedures may have failed to systematically lead learners to contrast the use of perfective and imperfective in prototypical contexts, and thus, to have stronger effects on interlanguage restructuring.

Finally, in the absence of data with respect to learners' attention to input processing, self-correction and other form-focussing procedures that were integrated in the environment, it is not possible to make conjectures with respect to the degree of attention that they facilitated in the current study.

6.4 Limitations and Future Research Directions

The analyses of the data revealed some limitations in the design and implementation of the study. One limitation is the small number of learners that participated in the study. Although the classroom-based nature of the study constitutes a major strength, it also restricted the number and type of learners that could participate in the experiment. During the implementation of the study, some learners of French from lower level classes and different departments of the participating university volunteered to enrol in the study, but could not be accepted as it was important to keep track of all learners' performance and their instructional conditions during their regular classroom time throughout the implementation of the study.

The absence of control groups for each developmental condition not receiving past tense instruction is one more limitation of the study. In light of the sizes of the participating classes, decisions had to be made with respect to the number of the experimental groups during the design of the study. The inclusion of two control groups would have required larger number of participating classes, with the same instructional profiles, but there were none left! The presence of a control group would have probably revealed that exposure to past tense instruction through multimedia was beneficial in comparison to no past tense instruction at all. Yet, these results would have not contributed to our understanding of how different aspects in the integration of multimedia instruction can facilitate L2 grammar development (for a critique on research that contrasts CALL-based versus non-CALL-based instruction, see Huh & Hu, 2005). Rather, decisions were made to favour the organization of a study that would examine the manner in which learners' interlanguage systems would respond to the integration of two different types of form-focussed multimedia instruction at two different points of past

tense development. Certainly, in future research a larger number of learners and a control group should be included.

One intervening variable in the results that obtained was undoubtedly the L1 of the learners. It was argued, for instance, that among NR learners, L1-L2 similarities helped learners build form/meaning connections during the treatment, and this L1 influence may have benefited the use of past tense markers in non-prototypical contexts among learners who received prototypical instruction only. L1 influence may have also helped learners reach a developmental plateau prior to the treatment and, therefore, by the time of the experiment, the multimedia instruction to which learners were exposed was no longer effective. It remains, then, to be examined whether similar results could obtain when learners from different past tense proficiency levels who do not mark imperfective in their L1 are exposed to form-focussed multimedia instruction on prototypical and non-prototypical past.

One strength and limitation of the study was that learners from different developmental conditions were exposed to the same type of form-focussed activities. This was a strength that allowed us to determine the manner in which learners may respond to the same type of form-focussed instruction at different stages of development. The form-focussed activities implemented in the multimedia environment were constructed around highly meaning-oriented contexts in which different procedures were utilized to drive learners' attention to form without interrupting the meaning-oriented nature of the tasks. Evidence showed that all lessons were very successful in keeping learners' attention on meaning and that the form-focussing procedures implemented in the environment drew learners' attention to the perfective and imperfective forms. This type

of instruction, in turn, appeared to have been sufficient to promote interlanguage development among less proficient learners.

Among the more advanced participating learners, it was hypothesized that this type of form-focussed instruction on non-prototypical past would facilitate interlanguage development. Yet, results indicated that the multimedia instruction on non-prototypical past implemented was not adequate to promote significant changes in this area of their interlanguage systems. The differential results that obtained from learners at different levels of past tense proficiency highlight the need for reconsidering aspects in the implementation of form-focussed instruction for the teaching of non-prototypical past among more advanced learners.

In recent reviews of form-focussed instruction in French immersion programs, Lyster (Lyster, 2004a, 2007; Ranta & Lyster, 2007) has pointed out that interlanguage restructuring of forms that have become recalcitrant, as it seems to be the case of prototypical marking with the most prototypical verbs, may not benefit from instruction that emphasizes meaning, but from form-focussed instruction that includes noticing, awareness, and practice tasks with feedback. Although efforts were made in the current study to integrate the form-focussed tasks that Lyster recommends, the consistency and systematicity with which they appeared in the environments fluctuated. Future multimedia research on L2 grammar acquisition could benefit from the integration of these types of tasks in order to increase opportunities to gain control over challenging L2 forms, particularly because the meaning-oriented nature of the multimedia tasks and media itself may distract learners' attention from language. Further, future research could

examine the manner in which the systematicity of these procedures among learners at different developmental stages could impact interlanguage restructuring.

Form-focussed multimedia instruction on non-prototypical past provided learners with sustained and focussed opportunities to encounter the use of this type of past, but very few opportunities for learners to contrast past tense use in prototypical and non-prototypical contexts, as it was hypothesized that learners would make contrasts between the past tense that they encounter and the forms in their interlanguage systems. Drawing on the results of the study, one question that remains to be answered is whether the integration of tasks that provide more advanced Hispanophone learners of French with opportunities to contrast the use of past tense markers in the least prototypical contexts would accelerate interlanguage development.

With respect to input enhancement, results reported in White's (1998) classroom-based study and Doughty's (1991) computer-based study suggest that the use of input enhancement in multimedia environments may require some associated feature that scaffolds learning of the communicative value of the target L2 grammar form. Doughty, for instance, integrated sentence restatement in the computerized application in order to help participants understand the meaning of the relative clauses targeted in the study. In the case of the tense-aspect system, input enhancement may benefit from the integration of a pop-up feature that provides learners with opportunities to contrast the use of perfective and imperfective forms. Further, input enhancement could be used in multimedia narratives that expose learners to prototypical and non-prototypical contexts with the least prototypical verbs (e.g., "to fall" in perfective and imperfective), in order to help learners contrast the use of both grammatical aspects with the same verb type.

One more aspect to reconsider with respect to the experimental form-focussed multimedia treatment is the length of exposure to non-prototypical past that more advanced Hispanophone learners of French may require. The length of the form-focussed multimedia treatment appeared to have been sufficient to facilitate interlanguage restructuring among NR learners, irrespective of the past tense targeted in the environment. Analyses of the treatment and classroom data indicated that RD learners, however, were positively responding to the non-prototypical environment, whereas RD exposed to E1 indicated that the materials they were exposed to were not challenging enough. Drawing on this result an interesting research question to explore is whether a more sustained and focussed exposure to non-prototypical past through multimedia could facilitate interlanguage restructuring among learners who are reaching a developmental plateau.

Despite efforts to control for the level of language complexity in the study, the lessons and testing instruments required sufficient lexical and morphological and syntactic proficiency from learners to participate in the study. It is clear from the cloze test score range that learners in the NR group were at a post-emergence stage of past tense development. Therefore, the study is also limited with respect to the effects that the treatment conditions could have had on the emergence of temporal morphology among the participants, particularly in the context in which the experiment was conducted, as the exposure to the target language is mostly limited to the classroom context. In this respect, future research should look at the manner in which prototypical and non-prototypical instruction can impact the emergence of tense and grammatical aspect.

The scoring procedures may have failed to capture the impact that multimedia instruction had on the development of past tense morphology and syntax, which, as evidence provided in Chapter 3 illustrated, constitute on their own a very complex and challenging area of the past tense learning. In the production task, the scoring procedure was limited to learners' ability to identify perfective and imperfective contexts only, as the focus of the study was investigating the manner in which the form-focussed multimedia treatment would help learners increase their past tense use in contexts where perfective and imperfective value align and confront the semantics of verbs.

In this respect, evidence gathered from the written production task, classroom and treatment materials suggest that the rich written exposure and writing practice that learners experienced during the experiment helped some of the learners improve their knowledge of irregular past participle forms required for the construction of the perfective and the appropriate use of imperfective endings. It was noticed, for instance, that three of the learners in the more proficient past tense group were operating with an ill-formed past participle of *avoir* “*avou*” (“to have”) to mark perfective prior to the treatment. At the post-test times, however, the learner exposed to Environment E2, which exposed him to the correct past participle of *avoir* (i.e., *eu*), had acquired the correct past participle form. Other cases of improvement in perfective morphology were changes in ill-formed past participles of *sentir* “to feel” and *penser* “to think” that learners had used as *sentu* and *pensu* instead of *senti* and *pensé*.

With respect to imperfective, it should be noted that the pronunciation of imperfective marking with first-group verbs, which seem to be highly recurrent, is exactly the same for the French forms of I, you (singular/informal), he/she/the impersonal

we (i.e., *on*), and they (masculine and feminine), as in *je quittais* /kɪtɛ/, *tu quittais* /kɪtɛ/,, *il/elle/on quittait* /kɪtɛ/, and *ils/elles quittaient* /kɪtɛ/. Therefore, learning imperfective morphology from aural input is practically impossible. One of the extracts from the classroom visit presented in Chapter 5 illustrated, however, that some learners appeared to have noticed and learned the difference between these forms through the use of the environment. One more instance of morphological improvement in imperfective use were changes in the use of the verb *sentir* and *appartenir*, from *je sentissais* to *je sentais* (I feel-IMP) and from *j'appartennissait* to *j'appartennais*, for which learners used morphological interlanguage forms prior to the intervention.

The nature of the study required that learners' use of past tense markers with different verb types be controlled across testing instruments, in order to make comparisons between the experimental groups. Particularly, in the case of past tense-production, it remains to be determined the impact that the multimedia treatment had on the freer production of learners (for further discussion on the advantages and disadvantages of testing instruments that control learners' past tense production, see Ayoun, 2005; Collins, 1999). Data collection instruments can consist of film-retelling written/oral narratives such as those used by Bardovi-Harlig and Bergström (1996) and Salaberry (1998), or controlled interviews such as those used by Clemance (2004), Harley (1986), Howard (2001, 2002), and Kilhstedt (2002). Given the highly frequent use of prototypical past that these types of tasks have been documented to elicit (e.g., Bardovi-Harlig, 1998), their implementation should include some mechanisms that elicit past tense markers with all verb types.

6.5 Contributions and Implications

Results from this study contribute to two bodies of research: tense-aspect SLA and CALL multimedia research. With respect to tense-aspect SLA, the study provides evidence for the effects of instruction and instructional procedures on the patterns that characterized the acquisition of the French past tense-aspect system. With respect to CALL, the study has provided evidence of different factors that could have an impact on the effects of multimedia instruction to accelerate L2 grammar development in the second/foreign language classroom.

With respect to past tense acquisition research, prior to this study the effects of the manipulation of past tense input on patterns of perfective and imperfective development had not been empirically examined among classroom-instructed learners of French. Although factors such as L1 influence and the effectiveness of instructional tasks appear to have contributed to the patterns of past tense development that obtained, results suggest that instruction that provides learners with natural or balanced exposure to perfective and imperfective appears to facilitate imperfective growth once learners have attained some control over perfective. Furthermore, once learners have developed notions of prototypical and non-prototypical marking, instruction may affect the rates of past tense markers, but their distribution may not be altered.

It has been suggested in the tense-aspect literature that focussed and sustained instruction on non-prototypical past may help more advanced learners extend their past tense systems to the least prototypical contexts (e.g., Howard, 2002). The absence of immediate evolution in the productive use of past tense that learners in the current study experienced reiterates the challenge that the use of non-prototypical past constitutes, even

among advanced learners of French who mark the perfective and imperfective difference in their L1. Further, results suggest that, once learners appear to have reached a developmental plateau in their use of perfective and imperfective, instruction on non-prototypical past may need to be delivered over long periods of time, include awareness and practice tasks that help learners contrast the use of past tense in the least prototypical contexts, and push learners to generalize this use of past tense to verbal predicates not targeted by the instruction.

Results from the production and comprehension tests contribute to SLA research, indicating that lexical aspect may affect not only L2 production, but also L2 intake. When learners are not able to discriminate grammatical aspect from the L2 input, they may rely on their internalized representations of the L2. This, in turn, may contribute to continue feeding learners' interlanguage systems with non-target like forms, promoting their stabilization. Further with respect to the acquisition of French L2, results provided evidence that the similarity between perfective and imperfective forms remains a challenge in the acquisition of the past tense despite proficiency increase, and that learners also require instructional interventions on this area of past tense.

The study provided further evidence to confirm that L1 influence contributes to the development of imperfective marking and that despite the benefit of L1-L2 similarities, the use of non-prototypical past constitutes a challenge in the development of the perfective and imperfective distinction among Hispanophone learners of French. Further, the results suggest that this challenge may persist among these learners despite increase in past tense proficiency, and focussed and sustained instruction. Yet, the results

suggest that Hispanophones may benefit from form-focussed instruction that helps them bridge L1 and L2 form-function mapping.

With respect to the use of multimedia environments in L2 grammar instruction, the study showed that multimedia constitutes a valuable instructional tool to expose learners to interesting and motivating meaning-oriented contexts in which they can obtain rich and sustained exposure to L2 grammar. Evidence collected also lent support to the argument that features in the multimedia environment can facilitate learners' attention to the linguistic features present in the environment, fostering conditions for noticing, awareness and intake of L2 forms during input and output tasks. The degree to which the individual use of the multimedia features explored in this study can foster these conditions and lead to restructuring of the learners' emerging grammars deserves consideration in future research.

The study provided preliminary evidence on the potential use of two types of corrective feedback during production tasks: prompts and peer collaboration. With respect to prompts, for instance, results point to the potential benefit of integrating this type of corrective feedback in multimedia environments to help learners at different stages of L2 grammar development systematically focus on language once they have developed some knowledge of the target forms; this type of feedback may be particularly helpful in multimedia environments where the meaning-oriented and media-distracting nature of the instructional tasks can distract learners' attention to form.

One more area of multimedia instruction upon which the current study has shed light is the potential of integrating video and linguistic input to help learners take in L2 forms. Results indicated that the sequence with which L2 input and video were presented

might have been an effective way to prime learners' L2 production, in order to help them produce language forms that they still need to acquire. Since this type of multimedia task may not facilitate system learning, but mere item learning/repetition, learners may require vast exposure to this type of tasks, to help them figure out the grammar system, or follow-up tasks that promote awareness.

Teachers' and learners' comments throughout the experiment indicated that the multimedia instruction had triggered meaningful questions not only with respect to the use of the target features, but also with respect to vocabulary and pronunciation. This finding highlights the need for examining the integration of multimedia instruction that contributes to the development of the L2 teaching agenda. Given, for instance, questions that the environment triggered with respect to phonological similarities between perfective and imperfective forms, classroom tasks could have been implemented to help learners practice differences in the pronunciation of these forms through the use of the least prototypical verb types in prototypical and non-prototypical contexts.

Furthermore, results suggest that the multimedia tasks stimulated learners' interest not only in language, but also in content (i.e., differences between narratives from French Canada and French Europe). This finding makes a valuable contribution to CALL research suggesting that the meaning-oriented nature of multimedia environments can foster conditions to motivate both L2 grammar development and content learning in the L2. Form-focussed instruction on challenging areas of L2 grammar, such as conditionals, could be integrated into multimedia environments that cover hard sciences such as mathematics, physics and chemistry, and with which learners are known to struggle (for

the use of multimedia to help learners with mathematics, see, for instance Atkinson, 2005).

This type of instruction could be amenable and of great interest in immersion programs and content-based L2 contexts, for instance, in which learners need form-focussed instruction to gain control over the L2 while learning content. Further, this type of form-focussed multimedia instruction on subject matter content could also be integrated in dual immersion programs, such as the English-Spanish programs in the USA, to promote collaborative work on content and language among learners from different L1s.

No other study in CALL had approached the effects of multimedia instruction on L2 acquisition from a developmental framework. The results from the study highlight the need to design multimedia studies that are informed by SLA research, not only to have an understanding of the processes that underpin the acquisition of grammar, but also of variables that intervene in these processes, delaying interlanguage development. On the one hand, knowledge of these processes and variables can facilitate the design of multimedia instructional tasks sequenced to help learners overcome these challenges. On the other hand, this knowledge facilitates the design of testing instruments that help examine the effects of multimedia instruction on different aspects of learners' interlanguage systems.

Finally, to language teachers, the current study shows that just like the use of any other classroom tasks or teaching materials, the use of multimedia applications requires careful planning and assessment in relation to, for instance, (a) learners' interest in the use of the computer applications; (b) the manner in which the environment can promote an

increase in knowledge of the target feature in relation to the knowledge that learners already possess; (c) the type of language opportunities that learners can have through the multimedia application, (e.g., meaning-oriented, metalinguistic discussion, aural/oral practice); (d) the instructional challenges that the use of these materials raises (e.g., time, use of computer-labs, preparation); and furthermore, (e) the manner in which the content of the multimedia application can fit the already packed-up syllabus that teachers cope with, providing opportunities for other language classroom practices.

CHAPTER 7

CONCLUSION

This classroom-based study was designed to investigate the effects of multimedia instruction on L2 grammar acquisition among young-adult university learners of French in the foreign language context. To test the effects of multimedia, a notoriously difficult area of French grammar was selected: the perfective and imperfective distinction.

Two research questions were formulated to examine the manner and degree to which two aspects of multimedia instruction could facilitate the development of the perfective and imperfective distinction: (a) the type of past tense targeted in the environment (i.e., prototypical and non-prototypical) and (b) learners' readiness to process non-prototypical past (i.e., ready and non-ready).

Q1: Is form-focussed multimedia instruction on non-prototypical past more effective at facilitating past tense improvement than form-focussed multimedia instruction on prototypical past?

Q2: Does the past tense developmental condition of L2 learners mediate the effects of multimedia instruction on past tense improvement?

While the type of past tense targeted in the environment did not have an impact on learners' past tense productive growth, learners' readiness to process non-prototypical past mediated the effects of multimedia on past tense production improvement. Multimedia instruction accelerated the rate of imperfective development among the less proficient past tense groups, but did not alter the distribution of past tense marking that characterizes the L2 acquisition of the tense-aspect system. Multimedia instruction did not have an immediate effect on past tense marking among the more advanced learners.

Further, the treatment did not lead to immediate past tense improvement in any of the comprehension-based tasks, in which the differentiation of perfective and imperfective from aural input proved to be notoriously difficult for all participants.

Aspects of the design and implementation of the multimedia treatment seemed to have contributed to this lack of effectiveness to facilitate interlanguage changes. While the integrative use of different media created rich conditions for noticing past tense marking, the multimedia treatment did not provide learners with systematic and sufficient opportunities to become aware of and gain control over the use of perfective and imperfective in the least prototypical contexts. Learners, particularly those who seemed to have reached a developmental plateau by the time of the multimedia treatment, could have benefited from more explicit form-focussed multimedia tasks facilitating the contrastive use of past tense marking in the least prototypical contexts. More advanced learners could have also benefited from a more extended form-focussed multimedia treatment providing them with more opportunities to gain control over the use of perfective and imperfective in non-prototypical contexts.

Results provided answers to the two research questions and left unanswered many more with respect to the effects of multimedia instruction on L2 grammar acquisition. One very important question that needs to be addressed is: Can L2 grammar knowledge that learners gain from multimedia instruction facilitate interlanguage restructuring and be transferred to L2 contexts that do not resemble those presented in the computer application?

Segalowitz (2000) notes that a “learning condition will be transfer appropriate if it activates cognitive operations that are likely to be reinstated later when the individual

attempts to put the learning into practice” (pp. 212-213). It would appear to be important to design multimedia applications that prepare learners for their actual use of the L2 in the real world, as Chapelle has pointed out (2002). Given the meaning-oriented (and potentially distracting media nature) of this instructional context, it is important to consider the integration of form-focussed tasks that promote sustained attention to form and that push learners to contrast the appropriate use of the L2 and the interlanguage system, providing them with opportunities to repair. Therefore, future multimedia research should consider the integration of tasks that favour the noticing, awareness and practice-with-feedback sequence (Lyster 2004; Ranta & Lyster, 2007).

In light of the understanding of the effectiveness of the current multimedia study and its limitations, the next step in my research agenda is to go back to the grammar classroom where CALL multimedia research is needed, and examine how developmental patterns of L2 grammar acquisition can be accelerated through different types of form-focussed multimedia tasks implemented at different stages of interlanguage development and through variations in the length and sequence of multimedia exposure. I anticipate that the results of the current study and my future research agenda will spark interest in the effective design of L2 grammar multimedia environments and in the integration of this type of applications in regular teaching practices to enrich learning opportunities in the L2 classroom.

References

- Abrate, J. (1983). An approach to teaching the past tenses in french. *The French Review*, 56, 546-553.
- Alegría de la Colina, A., & García-Mayo, M. d. P. (2006). Attention to form across collaborative tasks by low-proficiency learners in an efl setting. In M. d. P. García-Mayo (Ed.), *Investigating tasks in formal language learning (second language acquisition)* (pp. 91-116). Clevedon: UK: Multilingual Matters.
- Ammar, A. (2003). *Corrective feedback and l2 learning: Elicitations and recasts*. Unpublished doctoral dissertation, McGill University, Montreal, Québec, Canada.
- Ammar, A., & Lightbown, P. (2005). Teaching marked linguistic structures - more about the acquisition of relative clauses by arab learners of english. In A. Housen & M. Pierrard (Eds.), *Investigations in instructed second language acquisition* (pp. 167-198). Berlin: Mouton de Gruyter.
- Ammar, A., & Spada, N. (2006). One size fits all? Recasts, prompts and L2 learning. *Studies in Second Language Acquisition*, 28, 543-574.
- Andersen, R. W. (2002). The dimensions of pastness. In R. Salaberry & Y. Shirai (Eds.), *The L2 acquisition of tense-aspect morphology* (pp. 79-105). Amsterdam: John Benjamins.
- Andersen, R. W., & Shirai, Y. (1994). Discourse motivations for some cognitive acquisition principles. *Studies in Second Language Acquisition*, 16, 133-156.
- Ariew, R., & Ercetin, G. (2004). Exploring the potential of hypermedia annotations for second language reading. *Computer-assisted language learning*, 17, 237-259.
- Atkinson, R. (2005). Multimedia learning of mathematics. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (pp. 393-408). New York: Cambridge University Press.
- Ayoun, D. (2001). The role of negative and positive feedback in the second language acquisition of the *passé composé* and *imparfait*. *The Modern Language Journal*, 85, 226-243.
- Ayoun, D. (2004). The effectiveness of written recast in the second language acquisition of aspectual distinctions in French: A follow-up study. *The Modern Language Journal*, 88, 31-51.
- Ayoun, D. (2005). The acquisition of tense and aspect from a universal grammar perspective. In D. Ayoun & R. Salaberry (Eds.), *Tense and aspect in Romance languages* (pp. 79-128). Amsterdam: John Benjamins.
- Ayoun, D., & Salaberry, R. (Eds.). (2005). *Tense and aspect in Romance languages*. Amsterdam: John Benjamins.
- Ayres, R. (2002). Learner attitudes towards the use of CALL. *Computer Assisted Language Learning*, 15, 241-249.
- Bangs, P. (2003). Engaging the learner - how to author for best feedback. In U. Felix (Ed.), *Language learning online. Towards best practice* (pp. 81-96). Lisse, The Netherlands: Swets and Zeitlinger Publishers.
- Bardovi-Harlig, K. (2000). *Tense and aspect in second language acquisition: Form, meaning and use*. Malden, MA: Blackwell.

- Bardovi-Harlig, K. (2002). Analyzing aspect. In R. Salaberry & Y. Shirai (Eds.), *The L2 acquisition of tense-aspect morphology* (pp. 129-155). Amsterdam: John Benjamins.
- Bardovi-Harlig, K., & Bergström, A. (1996). Acquisition of tense and aspect in second language and foreign language learning: Learner narratives in ESL and FFL. *The Canadian Modern Language Review*, 52, 308-330.
- Bardovi-Harlig, K., & Reynolds, D. (1995). The role of lexical aspect on the acquisition of tense and aspect. *TESOL Quarterly*, 29, 107-131.
- Batstone, R. (1994). *Grammar*. Hong Kong: Cambridge University Press.
- Binnick, R. (1991). *Time and the verb: A guide to tense and aspect*. New York, NY: Oxford University Press.
- Blyth, C. (2005). From empirical findings to the teaching of aspectual distinctions. In D. Ayoun & R. Salaberry (Eds.), *Tense and aspect in Romance languages* (pp. 211-252). Amsterdam: John Benjamins.
- Borrás, I., & Lafayette, R. (1994). Effects of multimedia courseware subtitling on the speaking performance of college students of French. *The Modern Language Journal*, 78, 61-75.
- Brett, P. (1998). Using multimedia: A descriptive investigation of incidental language learning. *Computer Assisted Language Learning*, 11, 179-200.
- Brett, P. (2000). Integrating multimedia into the business English curriculum: A case study. *English for Specific Purposes*, 19, 269-290.
- Brown, C. (1993). Factors affecting the acquisition of vocabulary: Frequency and saliency of words. In T. Huckin, M. Haynes & J. Croady (Eds.), *Second language reading and vocabulary acquisition* (pp. 263-286). Norwood, N.J.: Ablex.
- Celce-Murcia, M., & Larsen-Freeman, D. (1999). *The grammar book. An ESL/EFL teacher's course*. Boston: Heinle & Heinle.
- Chapelle, C. (1998). Multimedia call: Lessons to be learned from research on instructed sla. *Language Learning and Technology*, 2, 22-34.
- Chapelle, C. (2001). *Computer applications in second language acquisition*. New York: Cambridge University Press.
- Chapelle, C. (2002). Computer-assisted language learning. In R. Kaplan (Ed.), *The Oxford handbook of applied linguistics* (pp. 498-505). New York: Oxford University Press.
- Chapelle, C. (2003). *English language learning and technology*. Amsterdam: John Benjamins.
- Chapelle, C. (2005). Interactionist SLA theory in call research. In J. Egbert & G. Mikel Petrie (Eds.), *CALL research perspective* (pp. 53-64). Mahwah, NJ: Lawrence Erlbaum.
- Chun, D. M., & Plass, J. L. (1996). Facilitating reading comprehension with multimedia. *System*, 24, 503-519.
- Chun, D. M., & Plass, J. L. (1997). Research on text comprehension in multimedia environments. *Language Learning & Technology*, 1, 60-81.
- Clemance, C. (2004). *L'acquisition de l'aspect dans les temps du passé par des apprenants anglophones*. Unpublished M.A. Thesis, The University of Western Ontario, London, Ontario, Canada.

- Cobb, T. (1997). Is there any measurable learning from hands-on concordancing? *System*, 25, 301-315.
- Cobb, T. (2005). The case for computer-assisted extensive reading. *Contact, Special Research Symposium Issue*, 31 (2) [online], TESOL Ontario, 2005.
- Cobb, T., & Stevens, V. (1996). A principled consideration of computers & reading in a second language. In M. Pennington (Ed.), *The power of CALL* (pp. 115-136). Houston: Athelstan.
- Cohen, J. (1988). *Statistical power analyses for the behavioural sciences*. Hillsdale, NJ: Lawrence Earlbaum.
- Collins, L. (1999). *Marking time: The acquisition of tense and grammatical aspect by French-speaking learners of English*. Unpublished doctoral dissertation, Concordia University, Montreal, Québec, Canada.
- Collins, L. (2002). The role of L1 influence and lexical aspect in the acquisition of temporal morphology. *Language Learning*, 52, 43-94.
- Collins, L. (2004). The particulars on universals: A comparison of the acquisition of tense-aspect morphology among Japanese and French-speaking learners of English. *The Canadian Modern Language Review*, 251-274.
- Collins, L. (2005). Accessing second language learners' understanding of temporal morphology. *Language Awareness*, 14, 207-220.
- Comrie, B. (1976). *Aspect*. Cambridge: Cambridge University Press.
- Comrie, B. (1985). *Tense*. Cambridge: Cambridge University Press.
- Corder, S. P. (1967). The significance of learners' errors. *International Review of Applied Linguistics*, 5, 161-170.
- De Lorenzo Roselló, C. (2001). Relations temporo-aspectuelles entre les procès dans le récit oral en français et castillan. In Y. Macchi (Ed.), *Panorama de la linguistique hispanique* (pp. 251-268). Lille: Publication de l'Université Lille III.
- DeKeyser, R. (1995). Learning second language grammar rules. An experiment with a miniature linguistic system. *Studies in Second Language Acquisition*, 17, 379-410.
- DeKeyser, R. (1998). Beyond focus on form: Cognitive perspectives on learning and practicing second language grammar. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 42-63). New York: Cambridge University Press.
- DeKeyser, R. (Ed.). (2007). *Practice in a second language*. New York: Cambridge University Press.
- Dlaska, A. (2002). Sites of construction: Language learning, multimedia, and the international engineer. *Computers & Education*, 39, 129-143.
- Doughty, C. (1991). Second language instruction does make a difference: Evidence from an empirical study of ESL relativization. *Studies in Second Language Acquisition*, 13, 431-469.
- Doughty, C., & Williams, J. (Eds.). (1998). *Focus on form in classroom second language acquisition*. New York: Cambridge University Press.
- Dunn, J. W. (Writer) (1967). Pink panic, *The Pink Panther Show*. U.S.A.: United Artists.
- Duquette, L., & Delphine, R. (1998). The evaluation of vocabulary acquisition when learning French as a second language in a multimedia environment. *Computer assisted language learning*, 11, 3-34.

- Edwards, V., Monaghan, F., & Knight, J. (2000). Books, pictures and conversations: Using bilingual multimedia story books to develop language awareness. *Language Awareness*, 9, 135-146.
- Edwards, V., Pemberton, L., Knight, J., & Monaghan, F. (2002). Fabula: A bilingual multimedia authoring environment for children exploring minority languages. *Language Learning & Technology*, 6, 59-69.
- Ellis, N. (2002). Frequency effects in language acquisition: A review with implications for theories of implicit and explicit language acquisition. *Studies in Second Language Acquisition*, 24, 143-188.
- Ellis, R. (2001). Investigating form-focussed instruction. *Language Learning*, 51, 1-46.
- Ellis, R. (2003). *Task-based language learning and teaching*. Oxford: Oxford University Press.
- Ellis, R., Basturkmen, H., & Loewen, S. (2001). Preemptive focus on form in the ESL classroom. *TESOL Quarterly*, 35(3), 407-432.
- Ellis, R., Loewen, S., & Erlam, R. (2006). Implicit and explicit corrective feedback and the acquisition of L2 grammar. *Studies in Second Language Acquisition*, 28, 339-368.
- Fields, A. (2005). *Discovering statistics using SPSS*. London, UK: SAGE.
- Fotos, S., & Browne, C. M. (Eds.). (2004). *New perspectives on CALL for second language classrooms*. Mahwah, NJ: Lawrence Erlbaum.
- Gaskell, D., & Cobb, T. (2004). Can learners use concordance feedback for errors? *System*, 32, 301-319.
- Groß, A., & Wolff, D. (2001). A multimedia tool to develop learner autonomy. *Computer Assisted Language Learning*, 14, 233-249.
- Harley, B. (1986). *Age in second language acquisition*. Clevedon: Multilingual Matters.
- Harley, B. (1989). Functional grammar in French immersion: A classroom experiment. *Applied Linguistics*, 10, 331-359.
- Harley, B. (1992). Patterns of second language in French immersion. *French Language Studies*, 2, 35-79.
- Harley, B. (1998). The role of focus-on-form tasks in promoting child L2 acquisition. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 156-174). Cambridge, UK: Cambridge University Press.
- Harley, B., Allen, P., Cummins, J., & Swain, M. (Eds.). (1987). *Development of bilingual proficiency. Final report. Volume II: Classroom treatment*. Toronto, ON: Modern Language Centre, OISE/UT.
- Harley, B., & Swain, M. (1978). An analysis of the verb system used by young learners of French. *Interlanguage Studies Bulletin*, 3, 35-79.
- Hedges, L. V., & Olkin, I. (1985). *Statistical method for meta-analysis*. Orlando, FL: Academic Press.
- Heller, I. (2005). Learner experiences and call - tool usability - evaluating the Chemnitz internetgrammar. *Computer-assisted language learning*, 18, 119-142.
- Housen, A., & Pierrard, M. (Eds.). (2005). *Investigations in instructed second language acquisition*. Berlin: Mouton de Gruyter.
- Howard, M. (2001). The effects of study abroad on the L2 learner's structural skills. *EUROSLA Yearbook*, 1, 123-141.

- Howard, M. (2002). Prototypical and non-prototypical marking in the advanced learner's aspectuo-temporal system. *EUROSLA Yearbook*, 2, 87-113.
- Huh, K., & Hu, W. (2005). Criteria for effective call research. In J. Egbert & G. M. Petrie (Eds.), *CALL research perspectives* (pp. 9-24). Mahwah, NJ: Lawrence Erlbaum.
- Hulstijn, J. H. (1997). Second language acquisition research in the laboratory possibilities and limitations. *Studies in Second Language Acquisition*, 19, 131-143.
- Izquierdo, J. (2006). Temporal morphology and language proximity: The development of tense-aspect markers among Hispanophone learners of French, *Joint conference of the American Association for Applied Linguistics and the Canadian Association of Applied Linguistics 2006*. Montreal, Canada.
- Izquierdo, J. (in progress). *Tense-aspect development in French L2: Benefits and limitations of L1-L2 similarities*. Unpublished manuscript, McGill University, Montreal, Canada.
- Izquierdo, J., & Collins, L. (in press). The facilitative role of L1 influence in tense-aspect marking: A comparison of Anglophone and Hispanophone learners of French. *The Modern Language Journal*.
- Izquierdo, J., & Lyster, R. (2007). Apprenons le français: Histoires et contes [Educational multimedia software with two learning environments. Each of them contains four one-hour lessons for the teaching of the French past tense]. McGill University, Montreal, Canada.
- Jones, L. C., & Plass, J. L. (2002). Supporting listening comprehension and vocabulary acquisition in French with multimedia annotations. *The Modern Language Journal*, 86, 546-561.
- Kaplan, M. (1987). Developmental patterns of past tense acquisition among foreign language learners of French. In B. VanPatten, T. Dvorak & J. Lee (Eds.), *Foreign language learning: A research perspective*. New York: Newbury House.
- Kihlstedt, M. (2002). Reference to past events in dialogue: The acquisition of tense and aspect by advanced learners of French. In R. Salaberry & Y. Shirai (Eds.), *The L2 acquisition of tense-aspect morphology* (pp. 323-363). Amsterdam: John Benjamins.
- Klein, W. (1994). *Time in language*. London UK: Routledge.
- Kramsch, C., & Andersen, R. (1999). Teaching text and context through multimedia. *Language Learning & Technology*, 2, 31-42.
- Krashen, S. (1982). *Principles and practice in second language acquisition*. Oxford: Pergamon.
- Krashen, S. (1998). Comprehensible output? *System*, 26, 175-182.
- LeLoup, J., & Ponterio, R. (2003). On the net | interactive and multimedia techniques in online language lessons: A sampler. *Language Learning & Technology*, 7, 4-17.
- LeLoup, J., & Ponterio, R. (2006). On the net. Dante: Digital and on the web. *Language Learning & Technology*, 10, 3-8.
- Lightbown, P. M. (1985a). Great expectations: Second language acquisition research and classroom teaching. *Applied Linguistics*, 6, 173-189.
- Lightbown, P. M. (1985b). Input and acquisition for second language learners in and out of classrooms. *Applied Linguistics*, 6, 263-273.

- Lightbown, P. M. (1998). The importance of timing in focus on form. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 177-196). New York: Cambridge University Press.
- Lightbown, P. M. (2001). Input filters in second language acquisition. *EUROSLA Yearbook, 1*, 79-97.
- Lightbown, P. M., & Spada, N. (2000). Do they know what they're doing? L2 learners' awareness of L1 influence. *Language Awareness, 9*(4), 198-217.
- Lightbown, P. M., & Spada, N. (2006). *How languages are learned*. Oxford, UK: Oxford University Press.
- Liskin-Gasparro, J. (2000). The use of tense-aspect morphology in Spanish oral narratives: Exploring the perceptions of advanced learners. *Hispania, 83*, 830-844.
- Loschky, L., & Bley-Vroman, R. (1993). Grammar and task-based methodology. In G. Crookes & S. Gass (Eds.), *Task and language learning: Integrating theory and practice* (pp. 123-167). Clevedon, UK: Multilingual Matters.
- Lyster, R. (1994). The effect of functional-analytic teaching on aspects of French immersion students' sociolinguistic competence. *Applied Linguistics, 15*, 263-287.
- Lyster, R. (1998). Recast, repetition and ambiguity in the L2 classroom discourse. *Studies in Second Language Acquisition, 20*, 55-85.
- Lyster, R. (2001). Negotiation of form, recasts, and explicit correction in relation to error types and learner repair in immersion classrooms. *Language Learning, 51*, 265-301.
- Lyster, R. (2004a). Differential effects for prompts and recast in form-focussed instruction classroom. *Studies in Second Language Acquisition, 26*, 399-432.
- Lyster, R. (2004b). Research on form-focused instruction in immersion classrooms: Implications for theory and practice. *Journal of French Language Studies, 14*, 321-341.
- Lyster, R. (2005). Comparing prompts and recasts in dyadic interaction, *Meeting of the Canadian Association of Applied Linguistics*. University of Western Ontario, London, ON.
- Lyster, R. (2007). *Learning and teaching languages through content: A counterbalance approach*. Amsterdam: John Benjamins.
- Lyster, R., & Mori, H. (2006). Interactional feedback and instructional counterbalance. *Studies in Second Language Acquisition, 28*, 269-300.
- Lyster, R., & Ranta, L. (1997). Corrective feedback and learner uptake. Negotiation of form in communicative classrooms. *Studies in Second Language Acquisition, 20*, 37-66.
- Mayer, R. E. (Ed.). (2005). *The Cambridge handbook of multimedia learning*. New York: Cambridge University Press.
- Mourelatos, A. (1981). Events, processes, states. In P. Tedeschi & A. Zaenen (Eds.), *Syntax and semantics: Vol 14. Tense and aspect* (pp. 191-212). New York: Academic Press. (Reprinted from *Linguistics and Philosophy, 2*, 415-434, 1968).
- Mueller, G. (1980). Visual contextual cues and listening comprehension: An experiment. *The Modern Language Journal, 64*, 335-340.
- Murray, G. (1999). Exploring learners' CALL experiences. *Computer assisted language learning, 12*, 179-195.

- Murray, L., & Barnes, A. (1998). Beyond the "wow" factor -evaluating multimedia language learning software from a pedagogical viewpoint. *System*, 26, 249-259.
- O'Connor Di Vito, N. (1995). *Using native speech to formulate past-tense rules in french*. Paper presented at the Georgetown University Roundtable on Languages and Linguistics, Georgetown University.
- Panova, I., & Lyster, R. (2002). Patterns of feedback and uptake in an adult esl classroom. *TESOL Quarterly*, 36, 573-595.
- Petrie, G. M. (2005). Visuality and call research. In J. Egbert & G. M. Petrie (Eds.), *Call research perspectives* (pp. 129-140). Mahwah, NJ: Lawrence Erlbaum Associate.
- Pienemann, M. (1987). Psychological constraints on the teachability of languages. In C. W. Pfaff (Ed.), *First and second language acquisition processes* (pp. 143-168). Rowley, MA: Newbury House.
- Pienemann, M. (1999). *Language processing and second language development. Processability theory*. Amsterdam: John Benjamins.
- Plass, J. L., Chun, D. M., Mayer, R. E., & Leutner, D. (2003). Cognitive load in reading a foreign language text with multimedia aids and the influence of verbal and spatial abilities. *Computers in Human Behaviour*, 19, 221-243.
- Plass, J. L., & Jones, L. C. (2005). Multimedia learning in second language acquisition. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (pp. 467-488). New York: Cambridge University Press.
- Ranta, L., & Lyster, R. (2007). A cognitive approach to improving immersion students' oral language abilities: The awareness-practice-feedback sequence. In R. DeKeyser (Ed.), *Practice in a second language* (pp. 141-160). New York: Cambridge University Press.
- Robinson, P. (1996). Learning simple and complex second language rules under implicit, incidental, rule-searched, and instructed conditions. *Studies in Second Language Acquisition*, 18, 27-67.
- Ryan, J. (Writer) (1968). Put-put, pink, *The Pink Panther Show*. U.S.A.: DePatie-Freleng Enterprises.
- Salaberry, R. (1998). The development of aspectual distinctions in L2 French classroom learning. *The Canadian Modern Language Review*, 54, 508-541.
- Salaberry, R. (2000). *The development of past tense morphology in L2 Spanish*. Amsterdam: John Benjamins.
- Salaberry, R. (2001). The use of technology for second language learning and teaching: A retrospective. *The Modern Language Journal*, 85, 39-56.
- Salaberry, R., & Shirai, Y. (Eds.). (2002). *The l2 acquisition of tense-aspect morphology*. Amsterdam: John Benjamins.
- Sanz, C. (2004). Computer-delivered implicit versus explicit feedback in processing instruction. In B. VanPatten (Ed.), *Processing instruction* (pp. 227-240). Mahwah, NJ: Lawrence Erlbaum.
- Sanz, C., & Morgan-Short, K. (2004). Positive evidence versus explicit rule presentation and explicit negative feedback: A computer-assisted study. *Language Learning*, 54, 35-78.
- Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11, 129-158.

- Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 3-32). Cambridge: Cambridge University Press.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10, 209-231.
- Sharwood-Smith, M. (1981). Consciousness-raising and the second language learner. *Applied Linguistics*, 11, 159-168.
- Sharwood-Smith, M. (1986). Comprehension versus acquisition: Two ways of processing input. *Applied Linguistics*, 7, 239-256.
- Sharwood-Smith, M. (1993). Input enhancement in instructed SLA. *Studies in Second Language Acquisition*, 15, 165-179.
- Shirai, Y. (2004). A multiple-factor for form-meaning connections in the acquisition of tense-aspect morphology. In B. VanPatten, J. Williams, S. Rott & M. Overstreet (Eds.), *Form-meaning connections in second language acquisition*. (pp. 91-114). NJ: Lawrence Erlbaum Associates, Publishers.
- Simard, D. (2007). L'éveil au langue en classe de langue seconde: De la sensibilisation langagière à l'enseignement de la forme. *Journal of French Language Studies*, 17, 187-206.
- Simard, D. (under review). Effets de la nature des éléments grammaticaux sur la saisie en français langue seconde. *Journal of French Language Studies*.
- Skehan, P. (1998). *A cognitive approach to language learning*. New York: Oxford University Press.
- Skehan, P. (2003). Focus of form, tasks, and technology. *Computer Assisted Language Learning*, 16, 391-411.
- Spada, N., & Fröhlich, M. (1995). *Colt. Communicative orientation of language teaching observation scheme: Coding conventions and applications*. Sydney, Australia: National Centre for English Language Teaching and Research.
- Spada, N., Lightbown, P., & White, J. (2005). The importance of form/meaning mapping in explicit form-focused instruction. In A. Housen & M. Pierrard (Eds.), *Investigations in instructed second language acquisition* (pp. 199-234). Berlin: Mouton de Gruyter.
- Spada, N., & Lightbown, P. M. (1999). Instruction, first language influence, and developmental readiness in second language acquisition. *Modern Language Journal*, 83, 1-22.
- Suzuki, T. (1996). *The effect of animated hypermedia instruction on the use of postpositional particles by beginning college students of Japanese*. The University of Texas at Austin, Austin.
- Swain, M. (1993). The output hypothesis: Just speaking and writing are not enough. *The Canadian Modern Language Review*, 50, 158-164.
- Swain, M. (1996). Integrating language and content in immersion classrooms: Research perspectives. *The Canadian Modern Language Review*, 52, 529-548.
- Swain, M. (1998). Focus on form through conscious reflection. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 64-82). New York: Cambridge University Press.
- Swain, M., & Carroll, S. (1987). The immersion observation study. In B. Harley, P. Allen, J. Cummins & M. Swain (Eds.), *Development of bilingual proficiency. Final*

- report. *Volume II: Classroom treatment*. Toronto, ON: Modern Language Centre, OISE/UT.
- Swain, M., & Lapkin, S. (1995). Problems in output and the cognitive processes they generate: A step towards second language learning. *Applied Linguistics*, 16, 371-391.
- Sweller, J. (2005). Implications of cognitive load theory for multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (pp. 19-48). New York: Cambridge University Press.
- Torlakovic, E., & Deugo, D. (2004). Application of a call system in the acquisition of adverbs in English. *Computer-assisted language learning*, 17, 203-235.
- Tsutsui, M. (2004). Multimedia as a means to enhance feedback. *Computer assisted language learning*, 17, 377-402.
- Vanderplank, R. (1988). The value of teletext subtitles in language learning. *ELT Journal*(42), 272-281.
- VanPatten, B. (1996). *Input processing and language instruction in second language*. Norwood, NJ: Ablex.
- VanPatten, B. (2002). Processing the content of input-processing and processing instruction research: A response to Dekeyser, Salaberry, Robinson, and Harrington. *Language Learning*, 52(4), 825-831.
- VanPatten, B. (2004). *Processing instruction: Theory, research, and commentary*. Mahwah, NJ: Lawrence Erlbaum.
- VanPatten, B., & Cadierno, T. (1993a). Explicit instruction and input processing. *Studies in Second Language Acquisition*, 15, 225-243.
- VanPatten, B., & Cadierno, T. (1993b). Input processing and second language acquisition: A role for instruction. *The Modern Language Journal*, 77, 45-57.
- VanPatten, B., & Oikkenon, S. (1996). Explanation versus structured input in processing instruction. *Studies in Second Language Acquisition*, 18, 495-510.
- VanPatten, B., & Wong, W. (2004). Processing instruction and the French causative: Another replication. In B. VanPatten (Ed.), *Processing instruction. Theory, research and commentary* (pp. 97-118). Mahwah, NJ: Lawrence Erlbaum.
- Wajnryb, R. (1990). *Grammar dictation*. Oxford: Oxford University Press.
- Warschauer, M., & Kern, R. (2000). *Network-based language teaching: Concepts and practice*. New York: Cambridge University Press.
- Warschauer, M., Turbee, L., & Roberts, B. (1996). Computer learning networks and student empowerment. *System*, 24, 1-14.
- Weist, R. (2002). The first language acquisition of tense and aspect: A review. In R. Salaberry & Y. Shirai (Eds.), *The L2 acquisition of tense-aspect morphology* (pp. 21-78). Amsterdam: John Benjamins.
- White, J. (1996). *An input enhancement study with ESL children: Effects on the acquisition of possessive determiners*. Unpublished doctoral dissertation, McGill University, Montreal, Québec, Canada.
- White, J. (1998). Getting the learners' attention. A typographical input enhancement study. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 85-113). New York: Cambridge University Press.
- White, J., Muñoz, C., & Collins, L. (in press). The his/her challenge: Making progress in a "regular" second language program. *Language Awareness*.

- Wong, W. (2004a). The nature of processing instruction. In B. VanPatten (Ed.), *Processing instruction* (pp. 33-64). Mahwah, NJ: Lawrence Erlbaum.
- Wong, W. (2004b). Processing instruction in French: The roles of explicit information and structured input. In B. VanPatten (Ed.), *Processing instruction. Theory, research and commentary* (pp. 187-206). Mahwah, NJ: Lawrence Erlbaum.
- Yoshi, M., & Flaitz, J. (2002). Second language incidental vocabulary retention: The effect of text and picture annotation types. *CALICO Journal*, 20, 33-58.

Appendix A: Tense-aspect/mood in Immersion Teachers' Discourse

Table 3.4

Distribution of Tense-aspect/mood in Immersion Teachers' Discourse

	Total	T1	T2	T3	T4	T5	T6
Tense-aspect/mood	(%)	(%)	(%)	(%)	(%)	(%)	(%)
<i>Présent indicatif</i>	67.37	69	60.95	62.23	66.25	70.17	75.62
<i>Passé composé</i>	8.22	9.46	8.87	9.88	7.81	8.17	5.1
<i>Futur proche</i>	7.11	5.08	6.07	5.73	9.32	10.58	5.85
<i>Impératif</i>	6.56	3.73	3.25	11.86	10.5	2.70	7.34
<i>Imparfait</i>	5.04	5.91	11.64	4.29	3.61	2.55	2.24
<i>Conditionnel présent</i>	2.75	2.4	6.23	2.59	0.92	2.99	1.37
<i>Subjonctif présent</i>	1.22	1.29	1.53	0.96	1.01	1.75	0.75
<i>Futur indicatif</i>	0.71	1.49	0.59	0.9	0.42	0.58	0.25
<i>Plus-que-parfait</i>	0.63	1.21	0.62	0.9	0.08	0.44	0.5
<i>Passé récent</i>	0.16	0	0.08	0	0	0.00	0.87
<i>Passé Simple</i>	0.10	0	0.03	0.54	0	0.00	0
<i>Conditionnel passé</i>	0.08	0.17	0.08	0.1	0.08	0.07	0
<i>Subjonctif passé</i>	0.03	0.02	0.03	0	0	0.00	0.12
<i>Futur antérieur</i>	0.02	0.02	0.03	0.02	0	0.03	0
Total	100	100	100	100	100	100	100
Minutes:	1685	502	498	365	135	115	70
Hrs.Min:	28.08	8.37	8.30	6.08	2.25	1.92	1.17

Appendix B1: Ethics and Consent Forms



Faculty of Education – Ethics Review Board
McGill University
Faculty of Education
3700 McTavish; Room 230
Montreal H3A 1Y2

Tel: (514) 398-7039
Fax: (514) 398-1527
Ethics website: www.mcgill.ca/rgo/ethics/human

Faculty of Education – Review Ethics Board
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 671-0506

Project Title : *Computer-mediated focus on form and the acquisition of the tense-aspect system by second language learners of French*

Applicant's Name: Jesús Izquierdo Department: DISE

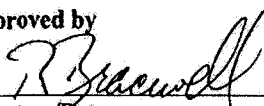
Status: Ph.D student Supervisor's Name: Roy Lyster

Granting Agency and Title (if applicable): SSHRC

Type of Review: Expedited ☒ Full ☐

This project was reviewed by: Shariff/Derevensky

Approved by

 June 7, 2006

Signature/Date

Robert Bracewell, Ph.D.

Chair, Education Ethics Review Board

Approval Period: June 9/06 to June 9/07

All research involving human subjects requires review on an annual basis. An Annual Report/Request for Renewal form should be submitted at least one month before the above expiry date. If a project has been completed or terminated for any reason before the expiry date, a Final Report form must be submitted. Should any modification or other unanticipated development occur before the next required review, the REB must be informed and any modification can't be initiated until approval is received. This project was reviewed and approved in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Subjects and with the Tri-Council Policy Statement on the Ethical Conduct for Research Involving Human Subjects.

6/6/06

McGill University – Faculty of Education
ETHICS REVIEW
RENEWAL REQUEST/FINAL REPORT

Continuing review of human subjects research requires, at a minimum, the submission of an annual status report to the REB. This form must be completed to request renewal of ethics approval. If a renewal is not received before the expiry date, the project is considered no longer approved and no further research activity may be conducted. When a project has been completed, this form can also be used as a Final Report, which is required to properly close a file. To avoid expired approvals and, in the case of funded projects, the freezing of funds, this form should be returned 3-4 weeks before the current approval expires.

REB File #: _____

Project Title: Computer-mediated focus on form and the acquisition of the tense-aspect system by second language learners of French

Principal Investigator: Jesús Izquierdo

Department/Phone/Email: DISE, 514 9918467, jesus.izquierdo@mail.mcgill.ca

Faculty Supervisor (for student PI): Roy Lyster

1. Were there any significant changes made to this research project that have any ethical implications? ___ Yes X No
If yes, describe these changes and append any relevant documents that have been revised.

2. Are there any ethical concerns that arose during the course of this research? ___ Yes X No. If yes, please describe.

3. Have any subjects experienced any adverse events in connection with this research project? ___ Yes X No
If yes, please describe.

4. ___ This is a request for renewal of ethics approval.

5. X This project is no longer active and ethics approval is no longer required.

6. List all current funding sources for this project and the corresponding project titles if not exactly the same as the project title above. Indicate the Principal Investigator of the award if not yourself.

Principal Investigator Signature: Jesús Izquierdo Date: April 2, 2007

Faculty Supervisor Signature: Roy Lyster Date: April 2, 2007
(for student PI)

☒ The closing report of this terminated project has been reviewed and accepted

☐ The continuing review for this project has been reviewed and approved

☐ Expedited Review ☐ Full Review

Signature of REB Chair or designate: [Signature] Date: April 12 '07

Approval Period: June 9/07 to June 9/08

4/2/07

Consent Form



McGill
UNIVERSITY

Formato de autorización

Leí la descripción del proyecto y estoy de acuerdo en él. De igual forma, se me ha informado que los resultados son para uso exclusivo de un proyecto de investigación, que mi identidad permanecerá en el anonimato, y que en cualquier momento puedo dejar de participar en el proyecto.

Nombre: _____

Firma: _____

Lugar: Villahermosa, Tabasco, México

Fecha: _____

Por favor indique los siguientes datos, para poder contactarle en caso de requerir más información acerca de su participación en el proyecto.

Email: _____

Tél.: _____

Appendix B2: Data Collection Instruments (Test Samples)

Cloze Task Samples

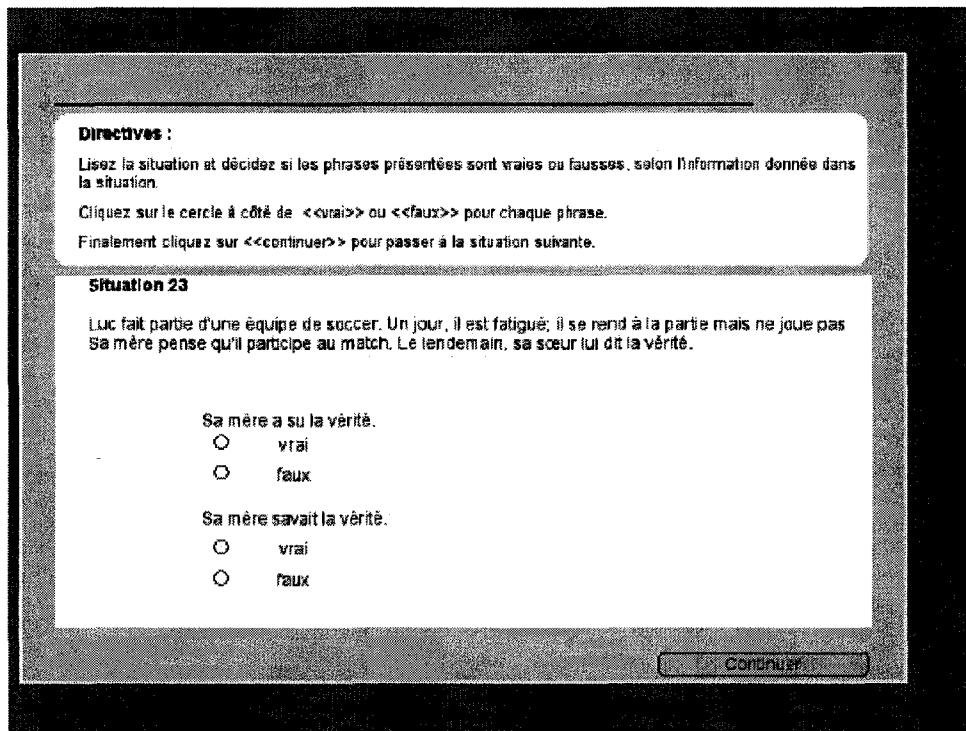
Example 4.1 Sample from Cloze Task Version A

Mes amis et moi avons suivi un entraînement intensif pour nous préparer à escalader le mont Everest. Malgré cet entraînement, l'année passée, pendant que je (monter) _____ le mont Everest, soudainement mon corps et ma tête ont semblé ne plus répondre. J'ai demandé à mes amis d'arrêter pour me reposer un peu. Je (dormir) _____, puis mes amis m'ont dit qu'ils voulaient continuer la marche jusqu'au coucher du soleil. Mais moi, je (se sentir) _____ très fatigué. Deux jours plus tard, nous avons décidé d'abandonner et de revenir chez nous, décision que nous (regretter) _____ maintenant! Pendant que nous (quitter) _____ le mont Everest, je me suis promis d'y retourner un jour, et de finir la montée.

Example 4.2 Sample from Cloze Task Version B

La première nuit de nos dernières vacances au Chiapas, nous (dormir) _____ dans un hôtel modeste plein de touristes européens. Le matin suivant, pendant que nous (quitter) _____ l'hôtel pour aller aux ruines de Palenque, nous avons rencontré des touristes français que nous avons invités à venir avec nous. Nous (regretter) _____ toujours cette invitation parce que pendant que nous (monter) _____ une des pyramides, un des français est tombé. Nous l'avons accompagné à la clinique parce que nous (se sentir) _____ responsables de lui.

Situational Task Samples



Directives :

Lisez la situation et décidez si les phrases présentées sont vraies ou fausses, selon l'information donnée dans la situation.

Cliquez sur le cercle à côté de <<vrai>> ou <<faux>> pour chaque phrase.

Finalement cliquez sur <<continuer>> pour passer à la situation suivante.

Situation 23

Luc fait partie d'une équipe de soccer. Un jour, il est fatigué; il se rend à la partie mais ne joue pas. Sa mère pense qu'il participe au match. Le lendemain, sa sœur lui dit la vérité.

Sa mère a su la vérité.

☐ vrai

☐ faux

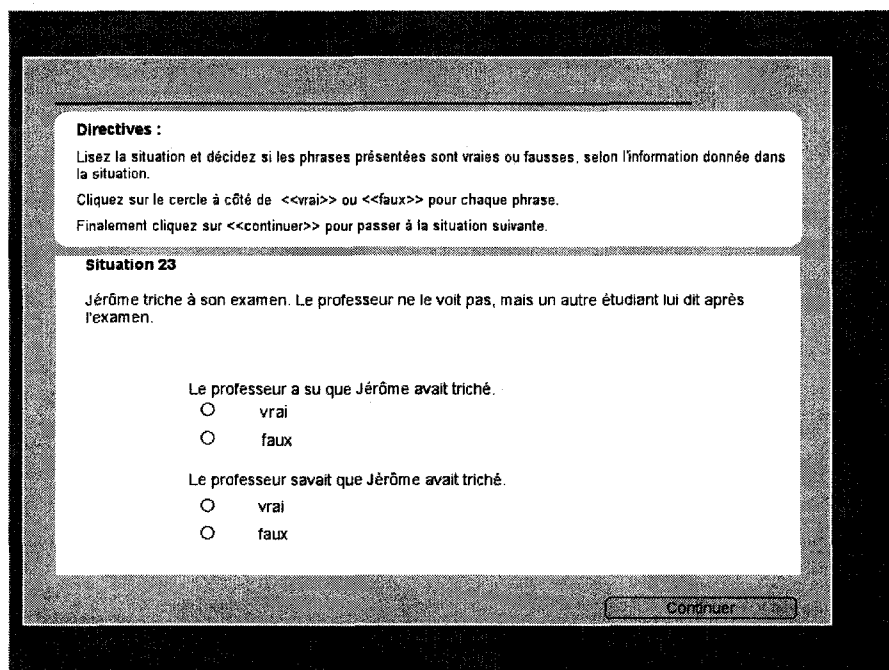
Sa mère savait la vérité.

☐ vrai

☐ faux

Continuer

Figure 4.17 Computer screen sample for Situational Task version A



Directives :

Lisez la situation et décidez si les phrases présentées sont vraies ou fausses, selon l'information donnée dans la situation.

Cliquez sur le cercle à côté de <<vrai>> ou <<faux>> pour chaque phrase.

Finalement cliquez sur <<continuer>> pour passer à la situation suivante.

Situation 23

Jérôme triche à son examen. Le professeur ne le voit pas, mais un autre étudiant lui dit après l'examen.

Le professeur a su que Jérôme avait triché.

☐ vrai

☐ faux

Le professeur savait que Jérôme avait triché.

☐ vrai

☐ faux

Continuer

Figure 4.18 Computer screen sample for Situational Task version B

Listening Test Samples

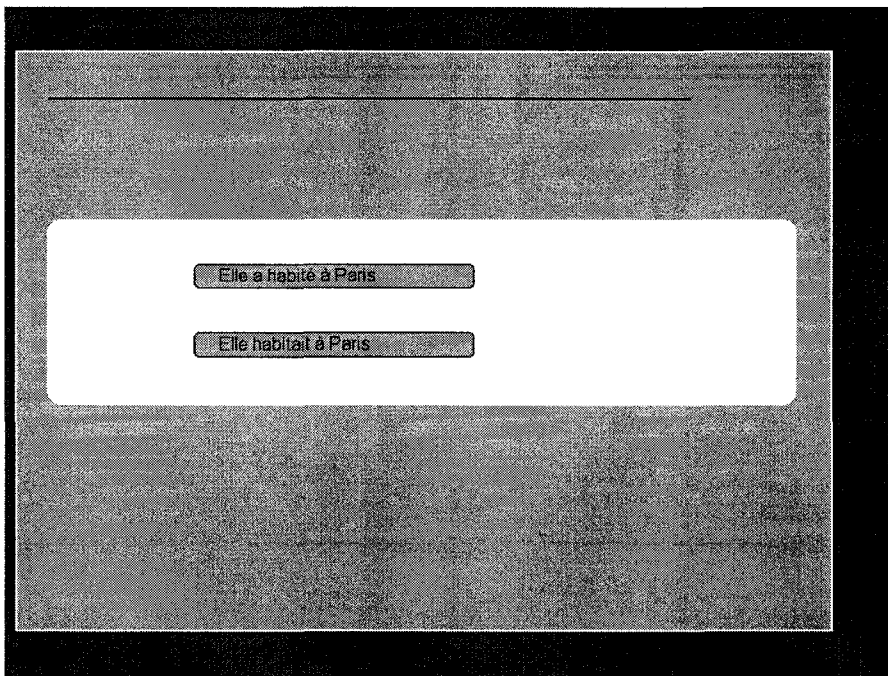


Figure 4.19 Computer screen sample for Listening Test version A

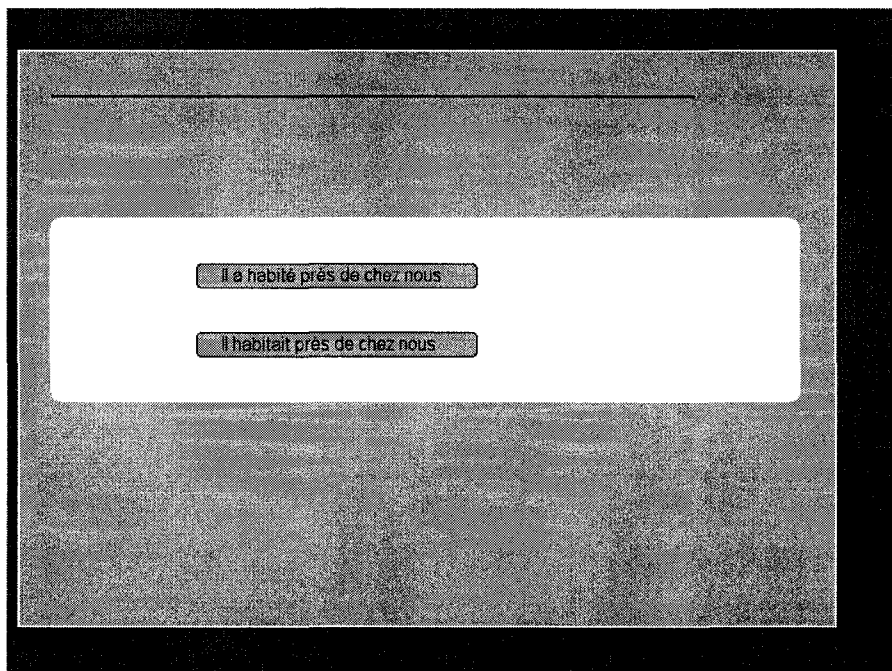


Figure 4.20 Computer screen sample for Listening Test version B

Appendix B3: Data Collection Instruments (Questionnaires)

Linguistic Background Questionnaire

I. Datos generales

Nombre: _____ Edad: _____ Sexo: _____

Grupo de francés: _____ Horario: _____ Fecha de hoy: _____

Ocupación: _____ Máximo grado de estudios: _____

II. Perfil lingüístico

1.- Francés es el _____ idioma extranjero que aprende.

primer ☐ segundo ☐ tercer ☐

2.- Por favor indique que otros idiomas, además del español y el francés habla.

3.- ¿Ha vivido o estudiado en algún país donde se hable el francés, cuál, por cuánto tiempo?

4.- Por favor indique cuántos años ha estado estudiando francés:

5.- Por favor, si ha tomado clases de francés en otras escuelas, indique dónde y cuánto tiempo.

Licenciatura ☐ *Alliance française* ☐ Otra ☐ Total de semestres: ____

6.- Si está tomado francés en otras escuelas, indique dónde y cuántas horas a la semana.

Licenciatura ☐ *Alliance française* ☐ Otra ☐ Horas a la semana: ____

7. ¿Cuántas horas fuera de clase le dedica al francés por semana?

1 o 2 ☐ 3 o 4 ☐ 5 horas o mas ☐

8. Marque las actividades en que invierte las horas antes indicadas.

Hacer tarea ☐ Club de estudio/conversación ☐ Leer revistas ☐

Leer en Internet ☐ Ver películas/videos ☐ Otros: _____

PARTICIPANT'S ATTITUDE QUESTIONNAIRE LESSON 1

(Adapted from Bórras & Lafayette, 1994; Lyster, 2004; White, 1996)

(These questions were delivered in Spanish through the computer at the end of the multimedia lesson; the English titles in parentheses did not appear in the software)

(I. LEARNERS' INTEREST IN THE LESSON TOPIC AND USE OF TECHNOLOGY)

1. The lesson theme was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

2. Overall, learning in this computerised environment that combines images, interactive sentences, coloured texts, etc., through the various tasks of the lesson was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(II. LEARNERS' INTEREST IN THE COMPLETION OF THE TENSE-ASPECT TASK)

3. The scrambled sentence interactive task was

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(III. LEXICAL DIFFICULTY)

4. Overall, vocabulary in the sentences of the scrambled sentence task was

- a) Very easy to understand
- b) Somewhat easy to understand
- c) Somewhat difficult to understand
- d) Very difficult to understand
- e) I did not understand some/many of the sentences

(IV. LEARNERS' PROCESSING OF THE SENTENCES OF THE MULTIMEDIA TENSE-ASPECT TASK)

5. To select the sentences in the scrambled sentence task

- a) I quickly read all the sentences
- b) I carefully read all the sentences
- c) I read all the sentences, paying special attention to verbs and their inflections
- d) I selected the sentences randomly
- e) None of the above

(V. LEARNERS' ATTENTION TO FEEDBACK DURING THE MULTIMEDIA TENSE-ASPECT TASK)

6. Overall, after reading the feedback questions that appeared when a wrong sentence was selected during the task completion, you went back to the task and

- a) quickly read all sentences
- b) carefully read each of the sentences, word by word
- c) read the sentences, paying special attention to the verbs and their inflections
- d) did not pay attention to the prompts
- e) did not pay attention to the prompts because I did not understand them

(VI. LEARNERS' APPRECIATION OF L2 AREAS THAT BENEFITED FROM THE MULTIMEDIA LESSON)

7. Overall, this computerised lesson helped you:

- a) increase your vocabulary
- b) understand some grammar structures
- c) improve your reading skills in French
- d) all of the above
- e) none of the above

Thank you

Input Enhancement Questionnaire
(Adapted from White, 1996, p.280)

Pendant ce projet, vous avez suivi 4 leçons basées sur :

Leçon 1 : La reconstruction d'un texte écrit

Leçon 2 : La reconstruction d'une dictée

Leçon 3 : Le visionnement de bande dessinée de la Panthère Rose

Leçon 4 : La rédaction d'un article pour un journal sur l'anecdote de la Panthère

1. Quelles leçons étaient les plus intéressantes? Pourquoi?
2. Quelles leçons étaient les moins intéressantes? Pourquoi?
3. Dans les leçons, il y avaient des lettres écrites en gros. À votre avis, pourquoi est-ce qu'on a élargi ces lettres-là?
4. Est-ce que cet agrandissement vous a gêné?
5. Est-ce que cet agrandissement vous a aidé à comprendre les textes?

Appendix B4: Data Collection Instruments (Classroom Observation Sheet)

(Adapted from Spada & Frölich, 1995)

Teachers' name: «Name» Date: Observation «*Obs1_Sep_2_to_8*» Number: 1

French level: «Level» Class time: «Time» Group: «Class»

[illegible]

Legend

FB: Feedback type (P: Prompt/ R:Recast) Initiator (T: Teacher/S: Student)

Examples (N: No / Y: Yes / # Nr of examples given / O: in Oral / W in Writing – on the board

Appendix C: Participants' Demographics

Participants' Demographics

Table 4.2

Age Distribution

Age:	16	19	20	21	22	23	24	26	28	29	37	40	45
<i>fr</i>	1	5	6	12	9	8	5	3	1	1	1	1	1
%	1.9	9.3	11.1	22.2	16.7	14.8	9.3	5.6	1.9	1.9	1.9	1.9	1.9

Table 4.3

Participants' Occupation

	Accountant	Economist	Housewife	Public Relations Agent	Student	Sales Manager	Teacher
<i>fr</i>	1	1	1	1	46	1	3
%	1.9	1.9	1.9	1.9	85.2	1.9	5.6

Table 4.4

Participants' Knowledge of Foreign Languages Other than French

	No answer	None	eng	eng ita	eng ger	eng ita jpn	eng ita jpn ger	ger	ger por
<i>fr</i>	1	1	21	25	2	1	1	1	1
%	1.9	1.9	38.9	46.3	3.7	1.9	1.9	1.9	1.9

Abbreviations:

eng = English, ger = German, ita = Italian, jpn = Japanese, por = Portuguese

Table 4.5

Participants' Number of Years Learning French

	1	1.5	2	2.5	3	3.5	4	6
<i>fr</i>	9	8	9	11	11	1	4	1
%	16.7	14.8	16.7	20.4	20.4	1.9	7.4	1.9

Table 4.6
Previous French Learning in Other Schools

	<i>fr</i>	<i>%</i>
<i>Alliance Française</i>	1	1.9
B.A. in Language Studies	24	44.4
B.A in Language Studies and <i>Alliance Française</i>	2	3.7
At a different university	1	1.9
No answer	19	35.2
Other schools	6	11.1
Technical University	1	1.9

Table 4.7
Current Attendance to French Classes at Other Schools

	<i>fr</i>	<i>%</i>
<i>Alliance Française</i>	1	1.9
B.A.	1	1.9
B.A. in Language Studies	18	33.3
No answer	31	57.4
Other schools	3	5.6

Table 4.8
French Study Hours Outside the Classroom

Hours:	1-2	3	4	5	6
<i>fr</i>	31	1	1	18	3
<i>%</i>	57.4	1.9	1.9	33.3	5.6

Table 4.9
French Study Activities Outside the Classroom

	Home-work		Study club		Magazine reading		Internet surfing		Film/ Music-Video watching		Music listening		Writing	
	<i>fr</i>	<i>%</i>	<i>fr</i>	<i>%</i>	<i>fr</i>	<i>%</i>	<i>fr</i>	<i>%</i>	<i>Fr</i>	<i>%</i>	<i>fr</i>	<i>%</i>	<i>fr</i>	<i>%</i>
No	6	11	47	87	43	80	30	56	34	63	42	78	53	98
Yes	48	89	7	13	11	20	24	44	20	37	12	22	1	2
Total	54	100	54	100	54	100	54	100	54	100	54	100	54	100

Appendix D: Lexical Aspect Analyses of Verbal Predicates per Lesson

Table 4.12

Verbal Predicates in Environment E1 Lesson 1

Verbal predicate	Lexical Category			
	Stat	Act	Acc	Ach
vivre près de la forêt	1			
être un homme impatient	1			
ne pas aimer socialiser	1			
ne pas avoir d'amis	1			
aimer quelqu'un	1			
travailler à la ferme		1		
décider de faire quelque chose				1
prendre son châle				1
jeter le châle sur les épaules				1
quitter la maison				1
être tard	1			
faire froid	1			
être dans la forêt	1			
mettre un morceau de...				1
retourner à la maison				1
être au lit	1			
dormir		1		
rentrer tard à la maison				1
se mettre au lit				1
déjeuner		1		
arrêter de faire quelque chose				1
faire une grimace			1	
ouvrir la bouche				1
retirer deux portions			1	
être rouges et jeunes	1			
ressembler à quelque chose	1			
quitter la chambre				1
sortir son châle				1
ne pas croire	1			
prendre son châle				1
sortir faire quelque chose				1
décider de faire				1
prendre son châle				1
jeter le châle sur les épaules				1
arriver chez quelqu'un				1

Table 4.12 continues on next page

Table 4.12

Verbal Predicates in Environment E1 Lesson 1 (Continued)

	Lexical Category			
	Stat	Act	Acc	Ach
se coucher				1
retourner à la maison				1
se mettre au lit				1
rentrer tarde à la maison				1
se mettre au lit				1
arrêter de faire quelque chose				1
arrêter de faire quelque chose				1
avoir dans la bouche	1			
ouvrir				1
quitter				1
marcher un kilomètre			1	
frapper la porte				1
entrer				1
<i>avoir</i>	1			
être	1			
sentir	1			
dormir		1		
parler		1		
Total	16	5	3	29

Table 4.13

Verbal Predicates in Prototypical Environment Lesson 2

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
ne pas être	1			
ne pas socialiser		1		
trouver du bois				1
avoir du bois	1			
être chez quelqu'un	1			
être au lit	1			
dormir profondément		1		
avoir un morceau	1			
il y avoir deux portions	1			
ressembler	1			
être un homme	1			
vivre comme un loup	1			
appartenir	1			
raconter des histoires		1		
circuler		1		
quitter la France				1
passer d'une génération à l'autre				1
arriver				1
connaître	1			
parler d'événements		1		
faire partie de quelque chose		1		
écouter attentivement		1		
se divertir		1		
arriver				1
parler d'événements		1		
être un homme	1			
travailler dans la forêt		1		
se promener		1		
jouer un rôle		1		
souligner quelque chose		1		
Totals	12	13	0	5

Table 4.14

Verbal Predicates in Environment E1 Lesson 3

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
avoir des déchets	1			
prendre une roue				1
avoir des déchets	1			
prendre une roue				1
conduire		1		
se briser				1
se briser				1
conduire		1		
être très résistante	1			
être très résistante	1			
habiter en ville	1			
habiter à la campagne	1			
mettre quelque chose dans quelque part				1
démarrer la motocyclette				1
mettre quelque chose dans quelque part				1
ne pas démarrer la motocyclette				1
sembler très inquiète	1			
rouler vers l'arrière		1		
rouler vers l'arrière		1		
sembler très inquiète	1			
attendre caché		1		
ne pas attendre caché		1		
circuler dans la rue		1		
circuler dans la rue		1		
gonfler les pneus		1		
gonfler les pneus		1		
être derrière quelqu'un	1			
conduire attentivement		1		
être derrière quelqu'un	1			
conduire attentivement		1		
s'arrêter				1
ne pas s'arrêter				1
tomber dans un lac				1
cogner son bras				1
casser son bras				1

Table 4.14 continues on next page

Table 4.14

Verbal predicates in Environment E1 Lesson 3 (Continued)

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
tomber dans un lac				1
ne pas cogner son bras				1
ne pas casser son bras				1
sortir du lac				1
marcher dans le jardin		1		
sortir du lac				1
être dans la rue	1			
courir pour s'échapper...		1		
courir pour s'échapper...		1		
courir devant quelqu'un		1		
courir derrière quelqu'un		1		
sembler faire quelque chose	1			
sembler faire quelque chose	1			
retourner				1
se mettre à travailler				1
retourner				1
se mettre à travailler				1
démarrer quelque chose				1
commencer à rouler				1
démarrer quelque chose				1
commencer à rouler				1
se sentir heureuse	1			
se sentir heureuse	1			
savoir faire quelque chose	1			
ne pas savoir faire quelque chose	1			
fonctionner		1		
ne pas fonctionner		1		
faire du bruit		1		
ne pas faire de bruit		1		
ne plus vouloir quelque chose	1			
ne plus vouloir quelque chose	1			
se mettre en colère				1
prendre une baguette				1
se mettre en colère				1

Table 4.14 continues on next page

Table 4.14

Verbal Predicates in Environment E1 Lesson 3 (Continued)

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
prendre une baguette				1
rentrer chez soi				1
visionner un vidéo			1	
rentrer chez soi				1
construire une motocyclette			1	
quitter la maison				1
prendre l'autoroute				1
quitter la maison				1
prendre l'autoroute				1
conduire un Kilomètre			1	
s'arrêter faire le plein				1
conduire un Kilomètre			1	
s'arrêter vérifier l'essence				1
surveiller les voitures		1		
surveiller les voitures		1		
garder la prison		1		
garder la prison		1		
entrer dans la cellule				1
s'asseoir				1
entrer dans la cellule				1
s'asseoir				1
cogner à la porte				1
entrer dans la cellule				1
cogner à la porte				1
entrer dans la cellule				1
apporter le gâteau à la Panthère			1	
couper un morceau			1	
apporter le gâteau à la Panthère			1	
donner un morceau				1
prendre une roue				1
construire une motocyclette			1	
tomber dans un lac				1
emmener à la prison			1	

Table 4.14 continues on next page

Table 4.14

Verbal Predicates in Environment E1 Lesson 3 (Continued)

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
avoir des déchets	1			
sembler inquiète	1			
rouler vers l'arrière		1		
surveiller les rues		1		
Totals	21	27	9	49

Table 4.15

Verbal Predicates in Environment E1 Lesson 4

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
avoir des déchets	1			
rouler dans l'autoroute		1		
être caché	1			
surveiller les autoroutes		1		
mettre quelque chose devant le réservoir...				1
être chez quelque part	1			
travailler dans son garage		1		
sortir de quelque part				1
prendre quelque chose				1
avoir des déchets	1			
frapper un panneau				1
être caché	1			
surveiller les autoroutes		1		
observer attentivement		1		
vouloir faire quelque chose	1			
rencontrer quelque part				1
s'échapper				1
exploser				1
allumer une allumette				1
mettre quelque chose dans quelque part				1
aller en prison			1	
devenir un danger				1
vivre dans la région	1			
Totals	7	5	1	10

Table 4.16

Verbal Predicates in Environment E2 Lesson 1

Verbal predicate	Lexical Category			
	Stat	Act	Acc	Ach
aimer Noël	1			
fêter Noël		1		
arriver de partout				1
mettre les cadeaux sous le sapin				1
se réveiller bien tôt				1
quitter leur lit				1
s'asseoir autour du sapin				1
ouvrir les cadeaux				1
ne pas arrêter de				1
trouver dans quelque chose				1
ne pas aimer quelque chose	1			
arriver				1
il y avoir	1			
attendre le Père Noël		1		
être longue	1			
avoir du temps	1			
pouvoir faire quelque chose	1			
venir de la maison d'à côté			1	
ne pas arrêter de...				1
commencer à faire quelque chose				1
voir quelque chose		1		
s'ouvrir lentement				1
arriver par la porte				1
être une surprise	1			
arriver par la cheminée				1
avoir une explication	1			
être difficile	1			
toujours aimer faire quelque chose	1			
croire à quelque chose	1			
aimer une rencontre avec quelqu'un	1			
arriver				1
mettre les cadeaux sous le sapin				1
arriver chez quelqu'un				1
donner quelque chose à quelqu'un				1
mettre les cadeaux sous ...				1

Table 4.16 continues on next page

Table 4.16

Verbal Predicates in Environment E2 Lesson 1 (Continued)

Verbal Predicates	Lexical Category			
	Stat	Act	Acc	Ach
finir le petit déjeuner				1
ouvrir les cadeaux				1
se réveiller bien tôt				1
quitter leur lit				1
s'asseoir autour du sapin				1
ouvrir les cadeaux				1
mettre trop de décorations				1
aimer faire quelque chose	1			
vouloir	1			
manger de la dinde		1		
bavarder		1		
être	1			
avoir	1			
allumer des bougies				1
casser				1
lire un conte			1	
couper un sapin			1	
tomber				1
Total	16	5	3	29

Table 4.17

Verbal Predicates in Environment E2 Lesson 2

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
être chez ses parents	1			
fêter Noël		1		
recevoir des cadeaux				1
ne pas aimer quelque chose	1			
avoir la chance de	1			
li y avoir	1			
attendre le Père Noël		1		
croire à quelque chose	1			
croire à quelque chose	1			
aimer une rencontre avec quelqu'un	1			
il y avoir	1			
vivre une tempête de ...	1			
connaître quelque chose	1			
Neiger sans arrêt		1		
regarder par la fenêtre		1		
tomber avec intensité				1
Quitter la maison				1
ne pas arrêter de				1
pouvoir faire quelque chose	1			
célébrer Noël		1		
chanter		1		
Danser		1		
Rire		1		
sortir de la maison				1
entendre les cloches		1		
être un moment magique	1			
exprimer quelque chose		1		
pleurer d'émotion		1		
jouer dans la neige		1		
boire du chocolat		1		
Totals	12	13		5

Table 4.18

Verbal Predicates in Environment E2 Lesson 3

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
avoir un problème	1			
tomber				1
tomber				1
avoir un problème	1			
voir quelque chose		1		
fermer quelque chose				1
ne pas fermer				1
voir quelque chose	1			
ne pas être terrifiée	1			
ne pas être terrifiée	1			
ne pas pouvoir	1			
pouvoir faire quelque chose	1			
ouvrir				1
sortir				1
sortir				1
ouvrir				1
sembler heureuse	1			
voir la réception de...		1		
sembler heureuse	1			
voir la réception de...		1		
écrire dans le livre...		1		
ne pas écrire dans le livre...		1		
courir sur le livre		1		
courir sur le livre		1		
suivre quelqu'un		1		
suivre quelqu'un		1		
ne pas continuer de		1		
être dans un endroit	1			
être dans un endroit	1			
ne pas continuer de		1		
entrer par quelque part				1
entrer par quelque part				1
sortir quelque chose				1
revenir				1

Table 4.18 continues on next page

Table 4.18

Verbal Predicates in Environment E2 Lesson 3 (Continued)

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
cogner à la porte				1
sortir quelque chose				1
revenir				1
ne pas cogner à la porte				1
attaquer quelqu'un		1		
prendre une douche			1	
prendre une douche			1	
ne pas attaquer quelqu'un		1		
ne pas utiliser de savon		1		
ne utiliser que ...		1		
s'essuyer		1		
s'essuyer		1		
ne jamais connaître..	1			
ne jamais savoir...	1			
se coucher				1
fermer la fenêtre				1
se coucher				1
se coucher				1
se mettre au lit				1
sortir de la chambre				1
personne ne sortir de la chambre				1
se mettre au lit				1
courir pour s'échapper		1		
courir pour s'échapper		1		
pouvoir faire quelque chose	1			
pouvoir faire quelque chose	1			
marcher dans		1		
marcher dans		1		
se battre dans le fantôme		1		
se battre dans le fantôme		1		
penser à faire quelque chose	1			
penser à faire quelque chose	1			
s'en voler				1
tomber				1

Table 4.18 continues on next page

Table 4.18

Verbal Predicates in Environment E2 Lesson 3 (Continued)

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
tomber				1
s'en voler				1
tomber dans les escaliers				1
chanter une chanson			1	
ne pas chanter de chanson			1	
tomber dans les escaliers				1
descendre les escaliers				1
se relever				1
se relever				1
descendre les escaliers				1
clouer un couvercle			1	
sortir du baril				1
ne pas sortir du baril				1
clouer un couvercle			1	
boire du vin		1		
boire du vin		1		
suivre quelqu'un dans		1		
suivre quelqu'un dans		1		
se briser				1
tomber dans les escaliers				1
tomber dans les escaliers				1
se briser				1
sortir de				1
entrer dans				1
sortir de				1
entrer dans				1
emmener quelqu'un à quelque part			1	
tomber				1
se lever				1
emmener quelqu'un à quelque part			1	
avoir un problème	1			
pouvoir faire quelque chose	1			
sembler contente	1			

Table 4.18 continues on next page

Table 4.18

Verbal Predicates in Environment E2 Lesson 3 (Continued)

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
tomber				1
sortir quelque chose				1
trouver la Panthère				1
emmener quelqu'un à quelque part			1	
Totals	21	27	9	49

Table 4.19

Verbal Predicates in Environment E2 Lesson 4

Verbal Predicate	Lexical Category			
	Stat	Act	Acc	Ach
voir la réception de...		1		
avoir un problème	1			
pouvoir s'échapper	1			
marcher dans le couloir		1		
suivre quelqu'un		1		
trouver				1
ne pas arrêter de				1
ne pas trouver de				1
penser à faire quelque chose	1			
connaître quelque chose	1			
s'enregistrer				1
vivre des choses	1			
combattre		1		
essayer de		1		
être capable de	1			
échapper de				1
retrouver				1
se rendre compte				1
sortir				1
réveiller				1
aller en prison			1	
disparaître				1
savoir	1			
Totals	7	5+	1	1

Appendix E: Lexical Profile Analyses of Past Tense Tasks per Lesson

Vocabulary Profile Analyses for Lesson 1

VP output for file Sans_titre

					Words in text (tokens):	242
					Different words (types):	117
					Type-token ratio:	0.48
					Tokens per type:	2.07
					Lex density (content words/total)	0.43
	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	81	95	215	88.84%		
Function:	...	...	(138)	(57.02%)		
Content:	...	...	(77)	(31.82%)		
K2 Words (1001 to 2000):	8	8	10	4.13%		
3K Words (2001 to 3000):	1	1	1	0.41%		
Off-List Words:	<u>2</u>	<u>13</u>	<u>16</u>	<u>6.61%</u>		
	90+?	117	242	100%		
					<i>Pertaining to onlist only</i>	
					Tokens:	226
					Types:	104
					Families:	90
					Tokens per family:	2.51
					Types per family:	1.16

Figure 4.1 Lexical analyses for Lesson 1 in the prototypical environment

VP output for file Prototypical scrambled senten

					Words in text (tokens):	303
					Different words (types):	141
					Type-token ratio:	0.47
					Tokens per type:	2.15
					Lex density (content words/total)	0.43
	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	94	113	257	84.82%		
Function:	...	...	(173)	(57.10%)		
Content:	...	...	(84)	(27.72%)		
K2 Words (1001 to 2000):	11	12	16	5.28%		
3K Words (2001 to 3000):	3	3	3	0.99%		
Off-List Words:	<u>2</u>	<u>13</u>	<u>27</u>	<u>8.91%</u>		
	108+?	141	303	100%		
					<i>Pertaining to onlist only</i>	
					Tokens:	276
					Types:	128
					Families:	108
					Tokens per family:	2.56
					Types per family:	1.19

Figure 4.2 Lexical analyses for Lesson 1 in the non-prototypical environment

Vocabulary Profile Analyses for Lesson 2

VP output for file Dictogloss Prototypical group

	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	61	73	137	73.26%	Words in text (tokens):	187
Function:	...	...	(90)	(48.13%)	Different words (types):	114
Content:	...	...	(47)	(25.13%)	Type-token ratio:	0.61
K2 Words (1001 to 2000):	8	9	10	5.35%	Tokens per type:	1.64
3K Words (2001 to 3000):	9	10	14	7.49%	Lex density (content words/total)	0.52
Off-List Words:	<u>?</u>	<u>22</u>	<u>26</u>	<u>13.90%</u>		
	78+?	114	187	100%	<i>Pertaining to onlist only</i>	
					Tokens:	161
					Types:	92
					Families:	78
					Tokens per family:	2.06
					Types per family:	1.18

Figure 4.3 Lexical analyses for Lesson 2 in the prototypical environment

VP output for file Non-prototypical Dictogloss

	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	81	95	163	88.59%	Words in text (tokens):	184
Function:	...	...	(106)	(57.61%)	Different words (types):	114
Content:	...	...	(57)	(30.98%)	Type-token ratio:	0.62
K2 Words (1001 to 2000):	8	8	8	4.35%	Tokens per type:	1.61
3K Words (2001 to 3000):	4	4	4	2.17%	Lex density (content words/total)	0.42
Off-List Words:	<u>?</u>	<u>?</u>	<u>9</u>	<u>4.89%</u>		
	93+?	114	184	100%	<i>Pertaining to onlist only</i>	
					Tokens:	175
					Types:	107
					Families:	93
					Tokens per family:	1.88
					Types per family:	1.15

Figure 4.4 Lexical analyses for Lesson 2 in the non-prototypical environment

Vocabulary Profile Analyses for Lesson 3

VP output for file prototypical video sentences

					Words in text (tokens):	411
					Different words (types):	165
					Type-token ratio:	0.40
					Tokens per type:	2.49
					Lex density (content words/total)	0.46
	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	102	123	324	78.83%		
Function:	...	...	(220)	(53.53%)		
Content:	...	...	(104)	(25.30%)		
K2 Words (1001 to 2000):	15	16	22	5.35%		
3K Words (2001 to 3000):	2	2	2	0.49%		
Off-List Words:	<u>?</u>	<u>24</u>	<u>63</u>	<u>15.33%</u>		
	119+?	165	411	100%		
					<i>Pertaining to onlist only</i>	
					Tokens:	348
					Types:	141
					Families:	119
					Tokens per family:	2.92
					Types per family:	1.18

Figure 4.5 Lexical analyses for Lesson 3 in the prototypical environment

VP output for file nonPrototypical Video Sentence

					Words in text (tokens):	425
					Different words (types):	132
					Type-token ratio:	0.31
					Tokens per type:	3.22
					Lex density (content words/total)	0.44
	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	72	87	310	72.94%		
Function:	...	...	(236)	(55.53%)		
Content:	...	...	(74)	(17.41%)		
K2 Words (1001 to 2000):	16	18	26	6.12%		
3K Words (2001 to 3000):	2	2	3	0.71%		
Off-List Words:	<u>?</u>	<u>25</u>	<u>86</u>	<u>20.24%</u>		
	90+?	132	425	100%		
					<i>Pertaining to onlist only</i>	
					Tokens:	339
					Types:	107
					Families:	90
					Tokens per family:	3.77
					Types per family:	1.19

Figure 4.6 Lexical analyses for Lesson 3 in the non-prototypical environment

Vocabulary Profile Analyses for Lesson 4

VP output for file VocAnalyses PTLesson4

					Words in text (tokens):	206
					Different words (types):	113
					Type-token ratio:	0.55
					Tokens per type:	1.82
					Lex density (content words/total)	0.49
					<i>Pertaining to onlist only</i>	
					Tokens:	173
					Types:	95
					Families:	84
					Tokens per family:	2.06
					Types per family:	1.13
	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	73	84	162	78.64%		
Function:	...	...	(105)	(50.97%)		
Content:	...	...	(57)	(27.67%)		
K2 Words (1001 to 2000):	9	9	9	4.37%		
3K Words (2001 to 3000):	2	2	2	0.97%		
Off-List Words:	<u>?</u>	<u>18</u>	<u>33</u>	<u>16.02%</u>		
	84+?	113	206	100%		

Figure 4.7 Lexical analyses for Lesson 4 in the prototypical environment

VP output for file task4Analyses

					Words in text (tokens):	206
					Different words (types):	105
					Type-token ratio:	0.51
					Tokens per type:	1.96
					Lex density (content words/total)	0.46
					<i>Pertaining to onlist only</i>	
					Tokens:	177
					Types:	91
					Families:	83
					Tokens per family:	2.13
					Types per family:	1.10
	<u>Families</u>	<u>Types</u>	<u>Tokens</u>	<u>Percent</u>		
K1 Words (1 to 1000):	69	76	162	78.64%		
Function:	...	...	(111)	(53.88%)		
Content:	...	...	(51)	(24.76%)		
K2 Words (1001 to 2000):	10	11	11	5.34%		
3K Words (2001 to 3000):	4	4	4	1.94%		
Off-List Words:	<u>?</u>	<u>14</u>	<u>29</u>	<u>14.08%</u>		
	83+?	105	206	100%		

Figure 4.8 Lexical analyses for Lesson 4 in the non-prototypical environment

Appendix F: Worksheet samples for Multimedia Lessons 1 & 3

Follow-up Task-sheet for Lesson 1 (Environment E1)

Histoires et Contes: Leçon 1

Votre Nom : _____ Français Niveau : _____

Date : _____ Horaire : _____

Maintenant, créez **deux ou trois petits paragraphes** pour continuer l'histoire de Luc et Marie-Rose. Pour construire vos paragraphes, vous pouvez utiliser les verbes et temps de grammaire de votre choix, mais **il faut absolument que vous utilisiez les verbes suivants aux temps de grammaire donnés.**

Passé Composé	Imparfait
• Ouvrir • Quitter • Marcher un kilomètre • Frapper la porte • Entrer	• Avoir • Être • Sentir • Dormir • Parler

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Follow-up Task-sheet for Lesson 3 (Environment E2)

Histoires et Contes: Leçon 3

Votre Nom : _____ Français Niveau : _____

Date : _____ Horaire : _____

Maintenant, créez **deux ou trois petits paragraphes** pour raconter l'histoire de M. Panthère Rose. Pour construire vos paragraphes, vous pouvez utiliser les verbes et temps de grammaire de votre choix, mais **il faut absolument que vous utilisiez les verbes suivants aux temps de grammaire donnés.**

Passé Composé	Imparfait
• Avoir un problème • Pouvoir se protéger • Sembler contente • Connaître les mauvaises intentions	• Tomber • Sortir le fauteuil • Trouver la Panthère • Emmener les prisonniers en prison

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Appendix G: ANOVA and Pairwise Comparison Tables of Pre-test Scores

Table 5.2

One-way ANOVA of Score Comparisons between Cloze Task Versions at Pre-test

Source	SS	df	MS	F	Sig.
Between versions	166.46	1	166.46	.75	.39
Within versions	11541.47	52	221.95		
Total	11707.92	53			

Table 5.3

One-way ANOVA of Score Comparisons between Situational Task Versions at Pre-test

Source	SS	df	MS	F	Sig.
Between versions	.001	1	.001	.01	1
Within versions	21840.28	52	420.01		
Total	21840.28	53			

Table 5.4

One-way ANOVA of Score Comparisons between Listening Task Versions at Pre-test

Source	SS	df	MS	F	Sig.
Between versions	.016	1	.016	.001	1
Within versions	4951.58	52	95.22		
Total	4951.58	53			

Table 5.5

One-way ANOVA of Reaction Time Comparisons between Listening Task Versions at Pre-test

Source	SS	df	MS	F	Sig.
Between versions	5321.16	1	5321.16	.35	.56
Within versions	786953.14	52	15133.71		
Total	792274.29	53			

Table 5.6

Two-way ANOVA of Experimental Groups' Past Tense Score Comparisons in the Cloze Task at Pre-test

Source	Type III SS	df	MS	F	Sig.
Between groups					
Environment	6.35	1	6.35	.11	.74
Developmental Condition	8704.65	1	8704.65	148.50	.01
learnEnv* devCond	3.48	1	3.48	.06	.81
Error	2930.89	50	58.62		
Total	261132.00	54			
Corrected Total	11707.93	53			

Table 5.8

Mixed Design ANOVA of Experimental Groups' Perfective and Imperfective Score Comparisons in the Cloze Task at Pre-test

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	18186.82	1	18186.82	151.26	0.01
learnEnv	16.56	1	16.56	0.14	0.71
devCond* learnEnv	0.48	1	0.48	0.00	0.95
error	6011.95	50	120.24		
Within groups					
Grammatical aspect	4407.67	1	4407.67	17.63	0.00
gramAsp*devCond	10739.49	1	10739.49	42.96	0.00
gramAsp*learnEnv	805.00	1	805.00	3.22	0.08
gramAsp*devCond*	59.75	1	59.75	0.24	0.63
LearnEnv					
Error(gramAsp)	12498.51	50	249.97		

Table 5.8.A

Within Developmental Condition Pairwise Comparisons for the Interaction between Developmental Condition and Grammatical Aspect in the Cloze Task at Pre-test Time

devCond	gramAsp		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
NR	1	2	49.519	4.475	.000	40.530	58.508
RD	1	2	9.222	4.215	.033	.755	17.688

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.8 B

Within Grammatical Aspect Pairwise Comparisons for the Interaction between Developmental Condition and Grammatical Aspect in the Cloze Task at Pre-test Time

gramAsp	devCond		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
per	NR	RD	-6.071	2.745	.032	-11.584	-.558
imp	NR	RD	-46.369	4.523	.000	-55.453	-37.285

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.11

Mixed Design ANOVA of Experimental Groups' Prototypical and Non-prototypical Score Comparisons in the Cloze Task at Pre-test

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	17409.30	1	17409.30	148.50	0.01
learnEnv	12.69	1	12.69	0.11	0.74
devCond * learnEnv	6.97	1	6.97	0.06	0.81
Error	5861.78	50	117.24		
Within groups					
Past tense type	1716.27	1	1716.27	14.14	0.00
past type* devCond	259.43	1	259.43	2.14	0.15
past type* learnEnv	604.09	1	604.09	4.98	0.03
past type*devCond* learnEnv	76.61	1	76.61	0.63	0.43
Error(past type)	6068.94	50	121.38		

Table 5.11. A

Within Learning Environment Pairwise Comparisons for the Interaction between Past Tense Type and Learning Environment in the Cloze Task at Pre-test

Learning Environ	Past type		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
E1	Proto	Non-P	12.833	3.180	.000	6.445	19.221
E2	Proto	Non-P	3.276	2.870	.259	-2.489	9.041

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 11.B

Within Past Tense Type Pairwise Comparisons for the Interaction between Past Tense Type and Learning Environment in the Cloze Task at Pre-test

Past type	Learning Environment		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Proto	E1	E2	5.471	2.918	.067	-.390	11.333
Non-P	E1	E2	-4.086	3.086	.192	-10.285	2.113

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.15
*Two-way ANOVA of Experimental Groups' Past Tense Score Comparisons in the
 Situational Task at Pre-test*

Source	Type III SS	<i>df</i>	MS	<i>F</i>	Sig.
Between groups					
learnEnv	287.04	1	287.04	0.87	0.36
devCond	4671.16	1	4671.16	14.12	0.01
learnEnv * devCond	234.33	1	234.33	0.71	0.40
Error	16536.5	50	330.73		

Table 5.17

*Mixed Design ANOVA of Experimental Groups' Perfective and Imperfective Score**Comparisons in the Situational Task at Pre-test*

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	9342.32	1	9342.32	14.12	0.01
learnEnv	574.08	1	574.08	0.87	0.36
devCond * learnEnv	468.67	1	468.67	0.71	0.40
Error	33073.10	50	661.46		
Within groups					
Grammatical aspect	49.88	1	49.88	0.28	0.60
gramAsp*devCond	35.57	1	35.57	0.20	0.66
gramAsp*learnEnv	0.01	1	0.01	0.00	1.00
gramAsp*levCond*	239.22	1	239.22	1.32	0.26
learnEnv					
Error(gramAsp)	9074.70	50	181.49		

Table 5.19

Mixed Design ANOVA of Experimental Groups' Prototypical and Non-prototypical Score Comparisons in the Situational Task at Pre-test

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	9342.32	1	9342.32	14.12	0.00
learnEnv	574.08	1	574.08	0.87	0.36
devCond * learnEnv	468.67	1	468.67	0.71	0.40
Error	33073.10	50	661.46		
Within groups					
Tense-aspect type	261.99	1	261.99	2.43	0.13
t-a type * devCond	423.62	1	423.62	3.93	0.05
t-a type* learnEnv	77.73	1	77.73	0.72	0.40
t-a type*devCond*	97.35	1	97.35	0.90	0.35
learnEnv					
Error(t-a type)	5393.36	50	107.87		

Table 5.21

*Two-way ANOVA of Experimental Groups' Past Tense Score Comparisons in the
Listening Task at Pre-test*

Source	Type III SS	<i>df</i>	MS	<i>F</i>	Sig.
Between groups					
learnEnv	24.26	1	24.26	0.26	0.62
devCond	102.64	1	102.64	1.08	0.30
learnEnv * devCond	75.99	1	75.99	0.80	0.38
Error	4755.69	50	95.11		
Total	156252.00	54			
Corrected Total	4951.60	53			

Table 5.23

Mixed Design ANOVA of Experimental Groups' Perfective and Imperfective Score

Comparisons in the Listening Task at Pre-test

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	48.58	1	48.58	0.26	0.62
learnEnv	205.16	1	205.16	1.08	0.30
devCond * learnEnv	151.97	1	151.97	0.80	0.38
Error	9513.09	50	190.26		
Within groups					
gramAsp	8087.10	1	8087.10	26.17	0.01
gramAsp * devCond	18.59	1	18.59	0.06	0.81
gramAsp * learnEnv	140.82	1	140.82	0.46	0.50
gramAsp * devCond * learnEnv	175.31	1	175.31	0.57	0.45
Error(t-a)	15451.69	50	309.03		

Table 5.25

Mixed Design ANOVA of Experimental Groups' Prototypical and Non-prototypical Score Comparisons in the Listening Task at Pre-test

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	48.52	1	48.52	0.26	0.62
learnEnv	205.12	1	205.12	1.08	0.30
devCond * learnEnv	152.01	1	152.01	0.80	0.38
Error	9513.26	50	190.27		
Within groups					
Past tense type	9257.30	1	9257.30	37.68	0.01
past type * devCond	641.63	1	641.63	2.61	0.11
past type* LearnEnv	161.99	1	161.99	0.66	0.42
past type*devCond*	4.47	1	4.47	0.02	0.89
learnEnv					
Error(past type)	12284.97	50	245.70		

Table 5.27

Two-way ANOVA of Experimental Groups' Past Tense Reaction Time Comparisons at Pre-test

Source	Type III SS	<i>df</i>	MS	<i>F</i>	Sig.
Between groups					
devCond	326.81	1	326.81	0.02	0.89
learnEnv	6842.59	1	6842.59	0.44	0.51
devCond * learnEnv	4740.19	1	4740.19	0.30	0.58
Error	778998.62	50	15579.97		

Table 5.29

*Mixed Design ANOVA of Experimental Groups' Perfective and Imperfective Reaction
Time Comparisons in the Listening Task at Pre-test*

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	653.616	1	653.616	.021	.89
learnEnv	13685.186	1	13685.186	.439	.51
devCond * learnEnv	9480.370	1	9480.370	.304	.58
Error	1557997.241	50	31159.945		
Within groups					
gramAsp	72024.03	1	72024.03	2.48	.12
gramAsp* devCond	23706.87	1	23706.87	.82	.37
gramAsp *learnEnv	426.80	1	426.80	.02	.90
gramAsp *devCond*	3710.27	1	3710.27	.13	.72
learnEnv					
Error(t-a)	1451606.71	50	29032.14		

Table 5.31

*Mixed Design ANOVA of Experimental Groups' Prototypical and Non-prototypical
Reaction Time Comparisons in the Listening Task at Pre-test*

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	653.62	1	653.62	0.02	0.89
learnEnv	13685.19	1	13685.19	0.44	0.51
devCond * learnEnv	9480.37	1	9480.37	0.30	0.58
Error	1557997.24	50	31159.95		
Within groups					
Past type	386570.13	1	386570.13	26.70	0.01
past type *devCond	13338.71	1	13338.71	0.92	0.34
past type* learnEnv	1321.37	1	1321.37	0.09	0.76
past type*devCond*	13705.20	1	13705.20	0.95	0.34
learnEnv					
Error(t-a type)	724014.47	50	14480.29		

Appendix H: Tables of Means for Pre-test Scores

Table 5.10

Experimental Groups' Perfective and Imperfective Means in the Cloze Task at Pre-test

Experimental Groups	<i>n</i>	Grammatical Aspect	
		Perfective	Imperfective
E1-NR	12	77.29%	34.79%
		(13.92)	(20.85)
E1-RD	12	85%	79.79%
		(6.12)	(12.90)
E2-NR	13	83.65%	27.12%
		(12.27)	(19.63)
E2-RD	17	88.09%	74.85%
		(6.28)	(11.97)

Standard deviations are provided in parentheses

Table 5.12

Developmental Groups' Prototypical and Non-prototypical Means in the Cloze Task at Pre-test

Developmental Condition	<i>n</i>	Past Tense Type	
		Prototypical	Non-prototypical
NR	25	56.64%	51.84%
		(11.7)	(12.99)
RD	29	84.83%	74.76%
		(10.05)	(9.45)

Standard deviations are provided in parentheses

Table 5.14

Experimental Groups' Prototypical and Non-prototypical Means in the Cloze Task at pre-test

Experimental Group	<i>n</i>	Past Tense Type	
		Prototypical	Non-Prototypical
E1-NR	12	58.33%	50.33%
		(10.71)	(14.72)
E1-RD	12	89.33%	71.67%
		(8.75)	(10.16)
E2-NR	13	55.07%	53.23%
		(12.77)	(11.59)
E2-RD	17	81.65%	76.94%
		(9.91)	(8.55)

Standard deviations are provided in parentheses

Table 5.18

Experimental Groups' Perfective and Imperfective Means in the Situational Task at Pre-test

Experimental Groups	<i>n</i>	Grammatical Aspect	
		Perfective	Imperfective
E1-NR	12	70.83%	68.05%
		(21.17)	(27.26)
E1-RD	12	81.25%	86.8%
		(8.04)	(7.5)
E2-NR	13	58.97%	62.18%
		(34.1)	(24.91)
E2-RD	17	83.82%	83.33%
		(6.28)	(14.43)

Standard deviations are provided in parentheses

Table 5.20

Experimental Groups' Prototypical and Non-prototypical Means in the Situational Task at Pre-test

Experimental Group	<i>n</i>	Past Tense Type	
		Prototypical	Non-Prototypical
E1-NR	12	70.83% (24.75)	68.06% (21.85)
E1-RD	12	87.5% (10.96)	80.55% (10.26)
E2-NR	13	58.33% (29.46)	62.82% (24.44)
E2-RD	17	87.26% (12.88)	79.9% (15.33)

Standard deviations are provided in parentheses

Table 5.22

Experimental Groups' Past Tense Means in the Listening Task at Pre-test

Experimental Group	<i>n</i>	Mean	SD
E1-NR	12	54.86%	6.36
E1-RD	12	53.82%	9.48
E2-NR	13	49.68%	11.08
E2-RD	17	53.43%	10.75

Table 5.28

Experimental Groups' Past Tense Reaction Time Means in the Listening Task at Pre-test

Experimental Group	<i>n</i>	Mean	SD
E1-NR	12	457.38	151.55
E1-RD	12	471.34	162.32
E2-NR	13	453.56	81.61
E2-RD	17	429.66	98.93

Table 5.30

Experimental Groups' Perfective and Imperfective Reaction Time Means in the Listening Task at Pre-test

Experimental Groups	<i>n</i>	Grammatical Aspect	
		Perfective	Imperfective
E1-NR	12	408.39 (192.09)	506.37 (174.9)
E1-RD	12	464.13 (187.06)	478.55 (184.2)
E2-NR	13	420.44 (162.32)	486.69 (162.77)
E2-RD	17	414.63 (153.97)	444.7 (176.01)

Table 5.32

Experimental Groups' Prototypical and Non-prototypical Reaction Time Means in the Listening Task at Pre-test

Experimental Group	<i>n</i>	Past Tense Type	
		Prototypical	Non-Prototypical
E1-NR	12	416.01 (193.43)	498.75 (137.35)
E1-RD	12	384.75 (200)	557.92 (154.87)
E2-NR	13	396.5 (137.53)	510.63 (101.21)
E2-RD	17	372.91 (128.44)	486.42 (146.45)

Standard deviations are provided in parentheses

Appendix I: ANOVA and Pairwise Comparison Tables of Score Changes Over Time

Table 5.33

Mixed Design ANOVA of Experimental Groups' Past Tense Score Comparisons Over Time in the Cloze Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	14575.65	1	14575.65	90.50	0.001
learnEnv	18.04	1	18.04	0.11	0.739
devCond* learnEnv	44.13	1	44.13	0.27	0.603
error	8053.33	50	161.07		
Within groups					
testTime	3587.71	2	1793.86	50.73	0.001
testTime*devCond	835.13	2	417.57	11.81	0.001
testTime*learnEnv	74.83	2	37.42	1.06	0.351
testTime*devCond*	50.13	2	25.06	0.71	0.495
LearnEnv					
Error(testTime)	3536.04	100	35.36		

Table 5.33 A

Pairwise Comparisons of Cloze Task Means for the Main Effect Test Time

Test Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-8.789	1.198	.000	-11.758	-5.821
1	3	-11.011	1.045	.000	-13.600	-8.422
2	3	-2.222	1.217	.222	-5.237	.793

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.33 B

Within Developmental Condition Pairwise Comparisons of Cloze Task Means for the Interaction between Test Time and Developmental Condition

devCond	Test Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
NR	1	2	-13.667	1.745	.000	-17.989	-9.345
	1	3	-15.865	1.522	.000	-19.635	-12.096
	2	3	-2.199	1.772	.661	-6.589	2.191
RD	1	2	-3.912	1.643	.063	-7.982	.159
	1	3	-6.157	1.433	.000	-9.707	-2.607
	2	3	-2.245	1.669	.554	-6.380	1.889

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.36

Mixed Design ANOVA of Experimental Groups' Over Time Perfective and Imperfective Score Comparisons in the Cloze Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	29647.55	1	29647.55	86.21	0.001
learnEnv	3.31	1	3.31	0.01	0.922
devCond* learnEnv	135.63	1	135.63	0.39	0.533
error	17195.23	50	343.91		
Within groups					
gramAsp	4041.24	1	4041.24	9.77	0.003
testTime*gramAsp	1322.16	2	661.08	5.07	0.008
testTime*gramAsp*					
devCond	2747.56	2	1373.78	10.55	0.001
testTime*gramAsp*1					
earnEnv	125.06	2	62.53	0.48	0.620
testTime*gramAsp*					
devCond*learnEnv	65.71	2	32.86	0.25	0.777
Error(testTime*gram Asp)	13019.95	100	130.20		

Table 5.36 A

Within Grammatical Aspect Pairwise Comparisons for the Interaction between Grammatical Aspect and Testing Time

gramAsp	Test Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Per	1	2	1.006	1.259	1.000	-2.112	4.125
	1	3	-1.470	1.654	1.000	-5.568	2.628
	2	3	-2.476	1.454	.285	-6.079	1.126
Imp	1	2	-18.773	2.453	.000	-24.850	-12.696
	1	3	-21.040	2.324	.000	-26.798	-15.283
	2	3	-2.267	2.254	.958	-7.851	3.317

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.36 B

Within Test Time Pairwise Comparisons for the Interaction between Grammatical Aspect and Testing Time

Test Time	gramAsp		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
1	1	2	29.371	3.074	.000	23.196	35.545
2	1	2	9.591	2.635	.001	4.299	14.883
3	1	2	9.800	3.016	.002	3.743	15.857

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.36 C

Pairwise Comparisons for the Interaction between Developmental Condition, Grammatical Aspect and Test Time

devCond	gramAsp	Test Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
							Lower Bound	Upper Bound
NR	1	1	2	2.796	1.833	.400	-1.744	7.337
		1	3	-1.611	2.408	1.000	-7.577	4.356
		2	3	-4.407	2.117	.128	-9.652	.838
	2	1	2	-30.978	3.572	.000	-39.826	-22.129
		1	3	-31.162	3.384	.000	-39.545	-22.779
		2	3	-.184	3.282	1.000	-8.314	7.946
RD	1	1	2	-.784	1.726	1.000	-5.061	3.492
		2	3	-1.330	2.268	1.000	-6.949	4.290
		2	3	-.545	1.994	1.000	-5.485	4.395
	2	1	2	-6.569	3.364	.169	-14.902	1.765
		1	3	-10.919	3.187	.004	-18.814	-3.024
		2	3	-4.350	3.091	.496	-12.008	3.307

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.39

Mixed Design ANOVA of Experimental Groups' Over Time Prototypical and Non-prototypical Score Comparisons in the Cloze Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	29320.55	1	29320.55	91.00	0.01
learnEnv	30.37	1	30.37	0.09	0.76
devCond* learnEnv	79.20	1	79.20	0.25	0.62
error	16110.21	50	322.20		
Within groups					
pastType	5460.80	1	5460.80	54.37	0.01
pastType*devCond	477.63	1	477.63	4.76	0.03
pastType*learnEnv	843.65	1	843.65	8.40	0.01
pastType*devCond*learnEnv	1.14	1	1.14	0.01	0.92
Error(pastType)	5021.48	50	100.43		
testTime*pastType	2.30	2	1.15	0.01	0.99
testTime*pastType*devCond	67.31	2	33.66	0.36	0.70
testTime*pastType*learnEnv	91.77	2	45.88	0.49	0.61
testTime*pastType*devCond*learnEnv	353.20	2	176.60	1.90	0.16
Error(testTime*pastType)	9309.911	100	93.099		

Table 5.39 A

Within Developmental Condition Pairwise Comparisons for the Interaction between Developmental Condition and Past Type

devCond	Past Type		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
NR	Proto	Non-P	5.842	1.638	.001	2.552	9.132
RD	Proto	Non-P	10.748	1.543	.000	7.650	13.847

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.39 B

Within Past Type Pairwise Comparisons for the Interaction between Developmental Condition and Past Type

Past Type	devCond		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Proto	NR	RD	-21.674	2.224	.000	-26.142	-17.207
Non-P	NR	RD	-16.768	2.388	.000	-21.565	-11.971

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.39 C

Within Past Type Pairwise Comparisons for the Interaction between Past Type and Learning Environment

Past Type	Learning Environment		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Proto	E1	E2	2.642	2.224	.241	-1.826	7.109
Non-P	E1	E2	-3.879	2.388	.111	-8.676	.918

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.39 D

Within Learning Environment Pairwise Comparisons for the Interaction between Past Type and Learning Environment

Learning Environment	Past Type		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
E1	Proto	Non-P	11.556	1.670	.000	8.201	14.910
E2	Proto	Non-P	5.035	1.507	.002	2.007	8.062

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.42

Mixed Design ANOVA of Experimental Groups' Past Tense Scores Comparisons Over Time in the Situational Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
learnEnv	157.74	1.0	157.74	0.27	0.61
devCond	7615.85	1.0	7615.85	13.03	0.00
devCond* learnEnv	250.23	1.0	250.23	0.43	0.52
error	29229.09	50.0	584.58		
Within groups					
testTime	799.60	2.0	399.80	3.44	0.04
testTime*devCond	225.52	2.0	112.76	0.97	0.38
testTime*learnEnv	545.29	2.0	272.64	2.35	0.10
testTime*devCond*					
LearnEnv	149.75	2.0	74.87	0.65	0.53
Error(testTime)	11616.60	100.0	116.17		

Table 5.42 A

Pairwise Comparisons for the Main Effect Test Time in the Situational Task

Test Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-2.667	1.905	.503	-7.385	2.052
1	3	-5.497	2.446	.087	-11.557	.563
2	3	-2.830	1.887	.420	-7.506	1.845

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.45

Mixed Design ANOVA of Experimental Groups' Over time Perfective and Imperfective Score Comparisons in the Situational Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	16885.39	1	16885.39	14.12	0.00
learnEnv	524.12	1	524.12	0.44	0.51
devCond* learnEnv	345.49	1	345.49	0.29	0.59
error	59805.55	50	1196.11		
Within groups					
gramAsp	249.71	1	249.71	0.94	0.34
testTime*gramAsp	426.24	2	213.12	1.83	0.17
testTime*gramAsp*					
devCond	266.54	2	133.27	1.15	0.32
testTime*gramAsp*l					
earnEnv	3.51	2	1.75	0.02	0.99
testTime*gramAsp*					
devCond*learnEnv	105.89	2	52.94	0.46	0.64
Error(testTime*gram Asp)	11641.28	100	116.41		

Table 5.47

Mixed Design ANOVA of Experimental Groups' Over Time Prototypical and Non-prototypical Score Comparisons in the Situational Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	15231.70	1	15231.70	13.03	0.00
learnEnv	315.47	1	315.47	0.27	0.61
devCond* learnEnv	500.47	1	500.47	0.43	0.52
error	58458.17	50	1169.16		
Within groups					
pastType	2155.42	1	2155.42	14.88	0.01
testTime*pastType	386.96	2	193.48	1.89	0.16
testTime*pastType*					
devCond	1135.37	2	567.69	5.56	0.01
testTime*pastType*					
learnEnv	69.70	2	34.85	0.34	0.71
testTime*pastType*					
devCond*learnEnv	59.94	2	29.97	0.29	0.75
Error(testTime*past					
Type)	10215.24	100	102.15		

Table 5.47 A

Within Testing Time Pairwise Comparisons for the Interaction Effect between Developmental Condition, Past Type and Testing Time

devCond	Past Type	Testing Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
							Lower Bound	Upper Bound
NR	Proto	1	2	-7.933	3.467	.079	-16.520	.655
		1	3	-17.121	3.969	.000	-26.952	-7.289
		2	3	-9.188	3.295	.022	-17.350	-1.026
	Non-P	1	2	-3.285	3.535	1.000	-12.042	5.471
		1	3	-2.804	4.162	1.000	-13.113	7.504
		2	3	.481	3.459	1.000	-8.089	9.051
RD	Proto	1	2	1.532	3.265	1.000	-6.556	9.620
		1	3	1.001	3.738	1.000	-8.259	10.261
		2	3	-.531	3.103	1.000	-8.218	7.156
	Non-P	1	2	-.980	3.329	1.000	-9.227	7.267
		1	3	-3.064	3.919	1.000	-12.773	6.646
		2	3	-2.083	3.258	1.000	-10.155	5.988

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.47 B

Within Past Type Pairwise Comparisons for the Interaction Effect between Developmental Condition, Past Type and Testing Time

devCond	Testing Time	Past Type		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
							Lower Bound	Upper Bound
NR	1	1	2	-.855	2.940	.772	-6.760	5.050
	2	1	2	3.793	3.497	.283	-3.231	10.816
	3	1	2	13.462	2.666	.000	8.107	18.816
RD	1	1	2	7.149	2.769	.013	1.587	12.710
	2	1	2	4.636	3.293	.165	-1.979	11.251
	3	1	2	3.084	2.511	.225	-1.959	8.127

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni

Table 5.51

Mixed Design ANOVA of Experimental Groups' Past Tense Score Comparisons Over Time in the Listening Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	31.65	1	31.65	0.38	0.54
learnEnv	7.99	1	7.99	0.10	0.76
devCond* learnEnv	197.63	1	197.63	2.38	0.13
error	4155.08	50	83.10		
Within groups					
testTime	47.71	2	23.86	0.25	0.78
testTime*devCond	415.75	2	207.87	2.22	0.11
testTime*learnEnv	635.70	2	317.85	3.39	0.04
testTime*devCond*					
LearnEnv	30.24	2	15.12	0.16	0.85
Error(testTime)	9376.68	100	93.77		

Table 5.51 A

Within Testing Time Pairwise Comparisons for the Interaction between Environment and Testing Time in the Listening Task

Environment	Testing time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
E1	1	2	-.346	3.161	1.000	-8.177	7.484
	1	3	5.209	2.631	.160	-1.307	11.726
	2	3	5.555	2.555	.103	-.775	11.885
E2	1	2	.613	2.853	1.000	-6.454	7.680
	1	3	-2.761	2.374	.751	-8.642	3.120
	2	3	-3.374	2.306	.449	-9.087	2.339

Based on estimated marginal means

Adjustment for multiple comparisons: Bonferroni.

Table 5.51 B

Within Environment Pairwise Comparisons for the Interaction between Environment and Testing Time in the Listening Task

Testing time	Environment		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
1	E1	E2	2.786	2.682	.304	-2.600	8.172
2	E1	E2	3.745	2.824	.191	-1.927	9.416
3	E1	E2	-5.185	2.301	.029	-9.807	-.562

Based on estimated marginal means

Adjustment for multiple comparisons: Bonferroni.

Table 5.55

Mixed Design ANOVA of Experimental Groups' Over Time Perfective and Imperfective Score Comparisons in the Listening Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	63.31	1	63.31	0.38	0.54
learnEnv	15.93	1	15.93	0.10	0.76
devCond* learnEnv	395.30	1	395.30	2.38	0.13
error	8310.65	50	166.21		
Within groups					
gramAsp	15933.44	1	15933.44	26.13	0.00
testTime*gramAsp	769.60	2	384.80	2.61	0.08
testTime*gramAsp*					
devCond	523.99	2	262.00	1.78	0.18
testTime*gramAsp*l					
earnEnv	32.55	2	16.28	0.11	0.90
testTime*gramAsp*					
devCond*learnEnv	715.29	2	357.65	2.43	0.09
Error(testTime*gram					
Asp)	14747.64	100	147.48		

Table 5.57

Mixed Design ANOVA of Experimental Groups' Over Time Prototypical and Non-prototypical Score Comparisons in the Listening Task

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	5.74	1	5.74	0.03	0.87
learnEnv	0.88	1	0.88	0.00	0.95
devCond* learnEnv	261.38	1	261.38	1.26	0.27
error	10406.02	50	208.12		
Within groups					
pastType	21412.14	1	21412.14	69.19	0.00
testTime*pastType	1776.08	2	888.04	5.55	0.01
testTime*pastType*					
devCond	112.73	2	56.37	0.35	0.70
testTime*pastType*l					
earnEnv	683.21	2	341.60	2.14	0.12
testTime*pastType*					
devCond*learnEnv	123.04	2	61.52	0.38	0.68
Error(testTime*past					
Type)	16002.39	100	160.02		

Table 5.57 A

Within Testing Time Pairwise Comparisons for the Interaction Effect Between Grammatical Aspect and Testing Time

gramAsp	Testing Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Proto	1	2	-.879	2.955	1.000	-8.199	6.440
	1	3	3.613	2.554	.490	-2.715	9.940
	2	3	4.492	2.599	.270	-1.947	10.930
Non-P	1	2	1.146	2.700	1.000	-5.543	7.834
	1	3	-5.256	2.500	.122	-11.449	.937
	2	3	-6.402	2.433	.034	-12.430	-.373

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.57 B

Within Grammatical Aspect Pairwise Comparisons for the Interaction Effect Between Grammatical Aspect and Testing Time

Testing Time	gramAsp		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
1	Proto	Non-P	18.707	3.048	.000	12.585	24.828
2	Proto	Non-P	20.732	2.829	.000	15.051	26.413
3	Proto	Non-P	9.838	2.551	.000	4.714	14.963

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.60

Mixed Design ANOVA of Experimental Groups' Reaction Time Comparisons Over Time

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	4766.58	1	4766.58	0.16	0.69
learnEnv	981.53	1	981.53	0.03	0.86
devCond* learnEnv	32295.24	1	32295.24	1.11	0.30
error	1449706.30	50	28994.13		
Within groups					
testTime	105859.97	2	52929.99	6.48	0.00
testTime*devCond	2775.07	2	1387.54	0.17	0.84
testTime*learnEnv	9077.15	2	4538.58	0.56	0.58
testTime*devCond*					
LearnEnv	1884.95	2	942.48	0.12	0.89
Error(testTime)	816421.07	100	8164.21		

Table 5.60 A

Pairwise Comparisons for the Main Effect Test Time

Testing Time		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	34.529	16.706	.132	-6.856	75.913
1	3	63.167	19.252	.006	15.476	110.859
2	3	28.639	16.617	.273	-12.524	69.802

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.62

*Mixed Design ANOVA of Experimental Groups' Over Time Perfective and Imperfective**Reaction Time Comparisons*

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	9533.55	1.00	9533.55	0.16	0.69
learnEnv	1962.56	1.00	1962.56	0.03	0.86
devCond* learnEnv	64590.60	1.00	64590.60	1.11	0.30
error	2899417.42	50.00	57988.35		
Within groups					
gramAsp	187338.09	1	187338.09	7.16	0.01
testTime*gramAsp	8192.77	2	4096.39	0.27	0.76
testTime*gramAsp*					
devCond	41545.21	2	20772.61	1.37	0.26
testTime*gramAsp*1					
earnEnv	13479.89	2	6739.94	0.45	0.64
testTime*gramAsp*					
devCond*learnEnv	4539.90	2	2269.95	0.15	0.86
Error(testTime*gram Asp)	1512710.19	100	15127.10		

Table 5.64

Mixed Design ANOVA of Experimental Groups' Over Time Prototypical and Non-prototypical Reaction Time Comparisons

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	9533.55	1	9533.55	0.16	0.69
learnEnv	1962.56	1	1962.56	0.03	0.86
devCond* learnEnv	64590.60	1	64590.60	1.11	0.30
error	2899417.42	50	57988.35		
Within groups					
pastType	1120398.71	1	1120398.71	70.29	0.00
testTime*pastType	746.65	2	373.33	0.03	0.97
testTime*pastType*					
devCond	31928.90	2	15964.45	1.36	0.26
testTime*pastType*l					
earnEnv	36494.42	2	18247.21	1.55	0.22
testTime*pastType*					
devCond*learnEnv	30371.43	2	15185.72	1.29	0.28
Error(testTime*past					
Type)	1175640.79	100	11756.41		

Appendix J: Treatment Effect Figures

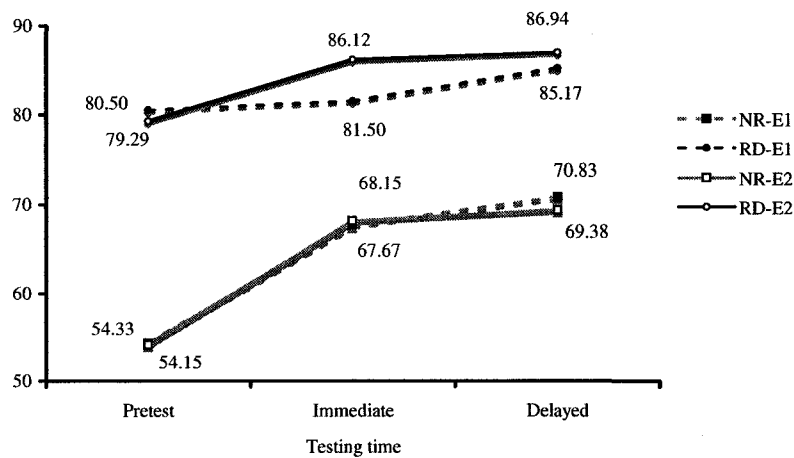


Figure 5.1 Experimental groups' cloze-task score means over time

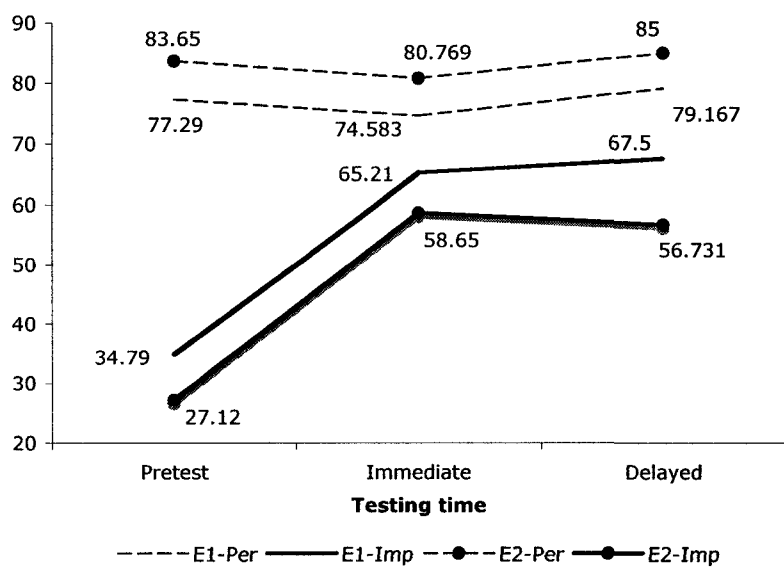


Figure 5.3 E1-NR and E2-NR groups' perfective and imperfective means in the cloze task over time

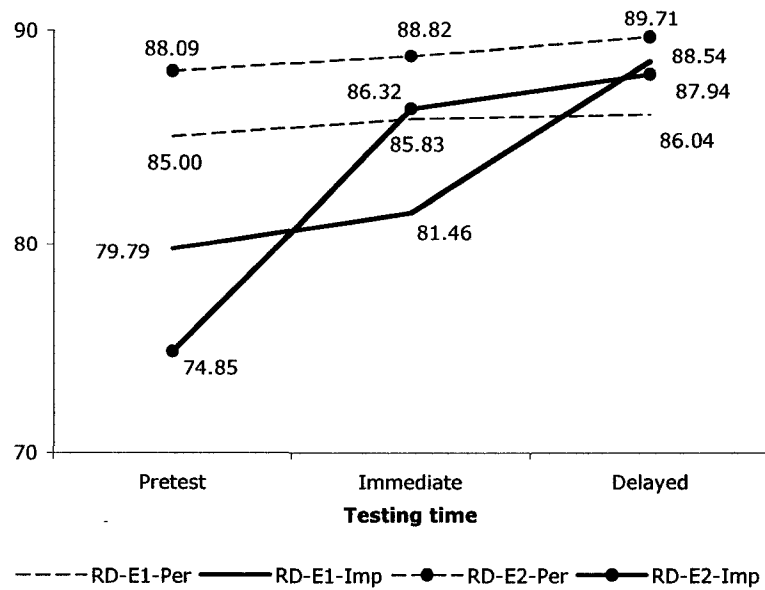


Figure 5.4 E1-RD and E2-RD groups' perfective and imperfective means in the cloze task over time

Appendix K: Tables of Means over Time

Table 5.35

Experimental Groups' Cloze Task Score Means Over Time

Exp. Group	Pre-test	Immediate Post-test	Delayed Post-test
NR-E1	54.33%	67.67%	70.83%
<i>n</i> = 12	(10.78)	(13.75)	(8.20)
RD-E1	80.50%	81.50%	85.17%
<i>n</i> = 12	(6.67)	(7.68)	(7.65)
NR-E2	54.15%	68.15%	69.38%
<i>n</i> = 13	(6.45)	(12.61)	(9.36)
RD-E2	79.29%	86.12%	86.94%
<i>n</i> = 17	(6.44)	(7.47)	(6.60)

Standard deviations are provided in parentheses

Table 5.38

Experimental Groups' Perfective and Imperfective Cloze Task Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Per 1	Imp 1	Per 2	Imp 2	Per 3	Imp 3
NR-E1	77.29%	34.79%	74.58%	65.21%	79.17%	67.50%
<i>n</i> = 12	(13.92)	(20.85)	(15.37)	(20.24)	(16.35)	(15.59)
RD-E1	85.00%	79.79%	85.83%	81.46%	86.04%	88.54%
<i>n</i> = 12	(6.12)	(12.90)	(8.35)	(12.04)	(10.31)	(8.22)
NR-E2	83.65%	27.12%	80.77%	58.65%	85.00%	56.73%
<i>n</i> = 13	(12.27)	(19.63)	(11.70)	(23.60)	(14.22)	(22.72)
RD-E2	88.09%	74.85%	88.82%	86.32%	89.71%	87.94%
<i>n</i> = 17	(6.28)	(11.97)	(6.62)	(12.84)	(6.90)	(9.89)

Note: Per stands for Perfective and Imp stands for Imperfective; Standard deviations are provided in parentheses

Table 5.41

Experimental Groups' Prototypical and Non-prototypical Cloze Task Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Proto 1	Non-p 1	Proto 2	Non-p 2	Proto 3	Non-p 3
NR-E1	58.33%	50.33%	72.00%	63.33%	76.33%	65.33%
<i>n</i> = 12	(10.71)	(14.72)	(17.97)	(13.08)	(9.57)	(11.10)
RD-E1	89.33%	71.67%	88.00%	75.00%	91.00%	80.00%
<i>n</i> = 12	(8.75)	(10.16)	(8.36)	(9.05)	(6.41)	(12.88)
NR-E2	55.08%	53.23%	71.08%	65.23%	69.23%	69.54%
<i>n</i> = 13	(12.77)	(11.59)	(14.80)	(15.70)	(12.90)	(9.74)
RD-E2	81.65%	76.94%	89.18%	83.06%	92.94%	80.94%
<i>n</i> = 17	(9.91)	(8.55)	(9.14)	(8.31)	(5.39)	(11.96)

Note: Proto stands for prototypical past and Non-p stands for non-prototypical past;

standard deviations are provided in parentheses

Table 5.44

Experimental Groups' Situational Task Score Means Over Time

Exp. Group	Pre-test	Immediate Post-test	Delayed Post-test
NR-E1	69.44%	73.61%	74.31%
<i>n</i> = 12	(21.71)	(21.86)	(23.83)
RD-E1	84.03%	82.99%	84.38%
<i>n</i> = 12	(7.07)	(8.23)	(9.08)
NR-E2	60.58%	67.63%	75.64%
<i>n</i> = 13	(25.94)	(18.80)	(15.94)
RD-E2	83.58%	84.07%	85.29%
<i>n</i> = 17	(13.05)	(12.69)	(8.98)

Standard deviations are provided in parentheses

Table 5.46

Experimental Groups Perfective and Imperfective Situational Task Score Means Over Time

	Pre-test		Immediate Post-test		Delayed Post-test	
	Per 1	Imp 1	Per 2	Imp 2	Per 3	Imp 3
NR-E1	70.83%	68.06%	74.31%	68.06%	72.22%	76.39%
<i>n</i> = 12	(21.17)	(27.26)	(20.55)	(27.26)	(26.91)	(23.53)
RD-E1	81.25%	86.81%	81.25%	86.81%	81.25%	87.50%
<i>n</i> = 12	(8.04)	(7.50)	(15.94)	(7.50)	(9.48)	(10.95)
NR-E2	58.97%	62.18%	67.31%	62.18%	73.72%	77.56%
<i>n</i> = 13	(34.10)	(24.91)	(19.68)	(24.91)	(24.02)	(14.59)
RD-E2	83.82%	83.33%	80.88%	83.33%	82.84%	87.75%
<i>n</i> = 17	(13.65)	(14.43)	(13.10)	(14.43)	(10.40)	(10.26)

Note: Per stands for perfective and Imp stands for imperfective; standard deviations are provided in parentheses

Table 5.48

Developmental Groups' Prototypical and Non-prototypical Situational Task Score Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Proto 1	Non-p 1	Proto 2	Non-p 2	Proto 3	Non-p 3
NR	64.33%	65.33%	72.33%	68.67%	81.67%	68.33%
<i>n</i> = 25	(27.48)	(22.91)	(24.62)	(18.83)	(19.54)	(21.92)
RD	87.36%	80.17%	85.92%	81.32%	86.78%	83.05%
<i>n</i> = 29	(11.92)	(13.25)	(13.75)	(14.03)	(13.09)	(9.04)

Note: Proto stands for prototypical past and Non-p stands for non-prototypical past;

standard deviations are provided in parentheses

Table 5.50

Experimental Groups' Prototypical and Non-prototypical Situational Task Score Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Proto 1	Non-p 1	Proto 2	Non-p 2	Proto 3	Non-p 3
NR-E1	70.83%	68.06%	77.08%	70.14%	82.64%	65.97%
<i>n</i> = 12	(24.75)	(21.86)	(25.65)	(22.04)	(22.04)	(27.40)
RD-E1	87.50%	80.56%	85.42%	80.56%	84.03%	84.72%
<i>n</i> = 12	(10.95)	(10.26)	(14.70)	(13.45)	(13.51)	(7.81)
NR-E2	58.33%	62.82%	67.95%	67.31%	80.77%	70.51%
<i>n</i> = 13	(29.46)	(24.44)	(23.78)	(16.12)	(17.80)	(16.18)
RD-E2	87.26%	79.90%	86.28%	81.86%	88.73%	81.86%
<i>n</i> = 17	(12.88)	(15.33)	(13.48)	(14.80)	(12.82)	(9.88)

Note: Proto stands for prototypical past and Non-p stands for non-prototypical past; standard deviations are provided in parentheses

Table 5.52

Multimedia Environment Groups' Listening Score Means Over Time

Environment	Pre-test	Immediate Post-test	Delayed Post-test
E1	54.34%	54.69%	49.13%
<i>n</i> = 24	(7.91)	(10.94)	(10.13)
E2	51.81%	51.11%	54.17%
<i>n</i> = 30	(10.87)	(9.41)	(7.50)

Standard deviations are provided in parentheses

Table 5.54

Experimental Groups' Listening Score Means Over Time

Exp. Group	Pre-test	Immediate Post-test	Delayed Post-test
NR-E1	54.86%	54.51%	53.47%
<i>n</i> = 12	(6.36)	(12.49)	(7.71)
RD-E1	53.82%	54.86%	44.79%
<i>n</i> = 12	(9.48)	(9.70)	(10.68)
NR-E2	49.68%	49.68%	55.45%
<i>n</i> = 13	(11.08)	(9.23)	(5.48)
RD-E2	53.43%	52.21%	53.19%
<i>n</i> = 17	(10.75)	(9.67)	(8.78)

Standard deviations are provided in parentheses

Table 5.56

Experimental Groups' Perfective and Imperfective Listening Score Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Per 1	Imp 1	Per 2	Imp 2	Per 3	Imp 3
NR-E1	63.89%	45.83%	59.72%	49.31%	60.42%	46.53%
<i>n</i> = 12	(12.98)	(10.95)	(16.98)	(14.85)	(14.27)	(13.51)
RD-E1	64.58%	43.06%	60.42%	49.31%	54.17%	35.42%
<i>n</i> = 12	(15.54)	(9.95)	(15.54)	(14.85)	(13.06)	(11.85)
NR-E2	58.97%	40.39%	49.36%	50.00%	59.62%	51.28%
<i>n</i> = 13	(18.15)	(20.65)	(15.76)	(18.32)	(19.20)	(20.37)
RD-E2	59.31%	47.55%	61.77%	42.65%	62.75%	43.63%
<i>n</i> = 17	(19.29)	(13.75)	(14.75)	(13.46)	(13.86)	(13.98)

Note: Per stands for Perfective and Imp stands for Imperfective; Standard deviations are provided in parentheses

Table 5.58

Prototypical and Non-prototypical Listening Task Score Means Over Time

Environment	Pre-test	Immediate Post-test	Delayed Post-test
Prototypical	62.35%	63.43%	59.41%
<i>n</i> = 54	(14.72)	(14.61)	(15.95)
Non-prototypical	43.52%	41.98%	48.77%
<i>n</i> = 54	(14.72)	(14.38)	(12.79)

Standard deviations are provided in parentheses

Table 5.59

Experimental Groups' Prototypical and Non-prototypical Listening Task Score Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Proto 1	Non-p 1	Proto 2	Non-p 2	Proto 3	Non-p 3
NR-E1	63.20%	46.53%	63.89%	45.14%	54.17%	52.08%
<i>n</i> = 12	(12.54)	(13.51)	(16.02)	(16.84)	(9.73)	(13.35)
RD-E1	66.67%	40.97%	63.19%	46.53%	52.08%	43.06%
<i>n</i> = 12	(14.65)	(14.42)	(16.46)	(10.93)	(20.14)	(11.14)
NR-E2	55.13%	44.23%	58.97%	40.39%	62.82%	53.21%
<i>n</i> = 13	(15.42)	(18.44)	(16.12)	(14.77)	(18.51)	(12.97)
RD-E2	64.22%	42.65%	66.67%	37.75%	65.69%	47.06%
<i>n</i> = 17	(14.95)	(13.46)	(11.02)	(14.17)	(11.37)	(12.48)

Note: Proto stands for prototypical past and Non-p stands for non-prototypical past;

standard deviations are provided in parentheses

Table 5.61

Experimental Groups' Reaction Time Means Over Time

Exp. Group	Pre-test	Immediate Post-test	Delayed Post-test
NR-E1	457.38	390.85	379.22
<i>n</i> = 12	(151.55)	(85.94)	(111.98)
RD-E1	453.56	419.72	406.87
<i>n</i> = 12	(81.61)	(143.91)	(83.26)
NR-E2	471.34	451.99	404.62
<i>n</i> = 13	(162.32)	(181.22)	(119.82)
RD-E2	429.66	411.27	368.56
<i>n</i> = 17	(98.93)	(100.77)	(126.14)

Standard deviations are provided in parentheses

Table 5.63

Experimental Groups' Perfective and Imperfective Reaction Time Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Per 1	Imp 1	Per 2	Imp 2	Per 3	Imp 3
NR-E1	408.39	506.37	368.73	412.97	382.08	376.36
<i>n</i> = 12	(192.09)	174.90)	(85.19)	128.46)	(153.62)	(95.19)
RD-E1	420.44	486.69	380.93	458.51	395.38	418.36
<i>n</i> = 12	(162.32)	162.77)	(184.07)	139.17)	(140.98)	(157.93)
NR-E2	464.13	478.55	443.09	460.90	376.83	432.41
<i>n</i> = 13	(187.06)	184.20)	(204.23)	196.15)	(128.05)	(127.96)
RD-E2	414.63	444.70	363.40	459.13	335.50	401.62
<i>n</i> = 17	(153.97)	176.01)	(159.28)	118.30)	(152.90)	(136.96)

Standard deviations are provided in parentheses

Table 5.65

Experimental Groups' Prototypical and Non-prototypical Reaction Time Means Over Time

Exp. Group	Pre-test		Immediate Post-test		Delayed Post-test	
	Proto 1	Non-p 1	Proto 2	Non-p 2	Proto 3	Non-p 3
NR-E1	416.01	498.75	339.26	442.44	352.50	405.94
<i>n</i> = 12	(193.43)	(137.35)	(128.57)	(127.28)	(101.10)	(147.24)
RD-E1	384.75	557.92	434.56	469.43	329.82	479.42
<i>n</i> = 12	(200.47)	(154.87)	(186.05)	(206.04)	(125.32)	(151.98)
NR-E2	396.50	510.63	332.07	507.37	323.13	490.61
<i>n</i> = 13	(137.53)	(101.21)	(118.72)	(202.78)	(113.12)	(128.70)
RD-E2	372.91	486.42	338.98	483.55	311.64	425.47
<i>n</i> = 17	(128.44)	(146.45)	(108.46)	(167.38)	(118.45)	(150.32)

Note: Proto stands for prototypical past and Non-p stands for non-prototypical past;

standard deviations are provided in parentheses

Appendix L: Tables of Mean Contrast Probabilities and Effect Sizes

Table 5.49

Probabilities and Effect Sizes for Situational Task Pairwise Mean Comparisons of the Interaction between Developmental Condition, Test Time and Past Type

Within past type; between testing times				
Developmental	Past Type	Testing Time		
Condition			Immediate	Delayed
NR	Prototypical	Pre-test	$p = .079$ $d = .30$	$p = .001$ $d = .72$
		Immediate		$p = .022$ $d = .41$
	Non-Prototypical	Pre-test	$p = 1$ $d = .16$	$p = 1$ $d = .12$
		Immediate		$p = 1$ $d = -.02$
	Prototypical	Pre-test	$p = 1$ $d = -.12$	$p = 1$ $d = -.08$
		Immediate		$p = 1$ $d = .04$
Non-Prototypical	Pre-test	$p = 1$ $d = .07$	$p = 1$ $d = .27$	
	Immediate		$p = 1$ $d = .18$	
Within testing time; between past type				
Developmental	Testing Time			
Condition		Pre-test	Immediate	Delayed
NR		$p = .772$ $d = -.03$	$p = .283$ $d = .17$	$p = .001$ $d = .65$
RD		$p = .013$ $d = .57$	$p = .165$ $d = .33$	$p = .225$ $d = .27$

Table 5.53

Probabilities and Effect Sizes for Listening Task Pairwise Mean Comparisons of the Interaction between Multimedia Environment and Test Time

Within environment and between testing times			
Developmental		Testing time	
Condition		Immediate	Delayed
E1	Pre-test	$p = 1$ $d = .04$	$p = .160$ $d = -.56$
	Immediate		$p = .103$ $d = -.52$
E2	Pre-test	$p = 1$ $d = -.07$	$p = .75$ $d = .25$
	Immediate		$p = .449$ $d = .35$
Between environments and within testing times			
		Testing time	
		Pre-test	Delayed
		Immediate	
		$p = .304$ $d = -.26$	$p = .029$ $d = .55$
		$p = .191$ $d = -.35$	

Appendix M: Tables of Statistical Analyses of Treatment Data

Table 5.66 A

Table of Maximum Likelihood Analyses of Variance of Correct and Erroneous Responses in Lesson 1

Source	df	Chi-Square	Pr > ChiSq
Environment	1	.47	< .0001
devCondition	1	16.52	.4926
Environment*devCondition	1	7.36	< .0001
Likelihood ratio	1		.0006

Table 5.66 B

Table of Maximum Likelihood Predicted Values for Error Frequency in Lesson 1

Env	devC	Response	Observed		Predicted		Residual
			Frequency	Standard Error	Frequency	Standard Error	
E1	NR	Correct	171	7.76	171	7.76	
		Erroneous	93	7.76	93	7.76	
E1	RD	Correct	181	7.54	181	7.54	
		Erroneous	83	7.54	83	7.54	
E2	NR	Correct	168	8.33	168	8.33	
		Erroneous	118	8.33	118	8.33	3.69E-10
E2	RD	Correct	288	8.14	288	8.14	-369-12
		Erroneous	86	8.14	86	8.14	

Table 5.66 C

Table of Maximum Likelihood Analyses of Variance of Immediate and Delayed Repairs in Lesson 1

Source	df	Chi-Square	Pr > ChiSq
Environment	1	.00	.4037
devCondition	1	.27	.9505
Environment*devCondition	1	2.00	.6045
Likelihood ratio	1		.1571

Table 5.66 D

Table of Maximum Likelihood Predicted Values of Immediate and Delayed Repairs in Lesson 1

Env	devC	Repair	Observed		Predicted		Residual
			Frequency	Standard Error	Frequency	Standard Error	
E1	NR	Delayed	40	4.77	40	4.77	0
		Immediate	53	4.77	53	4.77	0
E1	RD	Delayed	44	4.54	44	4.54	0
		Immediate	39	4.54	39	4.54	0
E2	NR	Delayed	59	5.43	59	5.43	0
		Immediate	59	5.43	59	5.43	0
E2	RD	Delayed	39	4.62	39	4.62	0
		Immediate	47	4.62	47	4.62	0

Table 5.67 A

Two-way ANOVA of Experimental Groups' Times on Erroneous Sentences in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	2.64E-03	1	2.64E-03	0	0.997
learnEnv	250.818	1	250.818	1.046	0.311
devCond*learnEnv	209.295	1	209.295	0.873	0.355
Error	11991.168	50	239.823		

Table 5.67 B

Two-way ANOVA of Experimental Groups' Times on Prompts in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	51.314	1	51.314	1.649	0.205
learnEnv	66.067	1	66.067	2.124	0.151
devCond*learnEnv	55.069	1	55.069	1.77	0.189
Error	1555.5	50	31.11		

Table 5.67 C

Two-way ANOVA of Experimental Groups' Times on Incorrect Repairs in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	149.745	1	149.745	1.243	0.27
learnEnv	78.026	1	78.026	0.648	0.425
devCond*learnEnv	355.696	1	355.696	2.953	0.092
Error	6022.077	50	120.442		

Table 5.67 D

Two-way ANOVA of Experimental Groups' Times on Correct Repairs in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	12.979	1	12.979	0.752	0.39
learnEnv	33.929	1	33.929	1.966	0.167
devCond*learnEnv	16.343	1	16.343	0.947	0.335
Error	863.08	50	17.262		

Table 5.67 E

Two-way ANOVA of Experimental Groups' Times on Immediate Repairs in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	61.621	1	61.621	3.201	0.08
learnEnv	43.821	1	43.821	2.276	0.138
devCond*learnEnv	5.261	1	5.261	0.273	0.603
Error	962.683	50	19.254		

Table 5.67 F

Two-way ANOVA of Experimental Groups' Times on Delayed Repairs in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	57.911	1	57.911	1.893	0.175
learnEnv	8.489	1	8.489	0.278	0.601
devCond*learnEnv	239.756	1	239.756	7.839	0.007
Error	1529.334	50	30.587		

Table 5.67 G

Within Environment Pairwise Comparisons for Time Mean Differences on Delayed Repairs

learnEnv	devCond		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
E1	NR	RD	-2.165	2.258	.342	-6.700	2.370
E2	NR	RD	6.350	2.038	.003	2.257	10.443

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.67 H

Within Developmental Condition Pairwise Comparisons for Time Mean Differences on Delayed Repairs

devCond	learnEnv		Mean Difference	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
NR	E2	E1	5.059	2.214	.027	.612	9.506
RD	E2	E1	-3.456	2.085	.104	-7.645	.732

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.68 A

Mixed Design ANOVA of Experimental Groups' Times on Prompt Sets in Lesson 1

Source	Type III SS	df	MS	F	Sig.
Between groups					
devCond	2.578	1	2.578	0.022	0.883
learnEnv	25.437	1	25.437	0.216	0.644
devCond*learnEnv	62.488	1	62.488	0.531	0.469
Error	5879.856	50	117.597		
Within groups					
prompt set	9669.494	2	4834.747	91.602	0.000
promptSet*devCond	39.195	2	19.597	0.371	0.691
promptSet*learnEnv	57.782	2	28.891	0.547	0.58
prompttest*learnEnv*devCond	120.766	2	60.383	1.144	0.323
Error(promptSet)	5278.02	100	52.78		

Table 5.68 B

Pairwise Mean Comparisons for the Main Effect Prompt Set

Prompt Set		Mean	Std.	Sig.	95% Confidence Interval for Difference	
		Difference	Error		Lower Bound	Upper Bound
1	2	15.676	1.682	.000	11.509	19.843
1	3	17.317	1.674	.000	13.17	21.463
2	3	1.641	0.595	.024	0.167	3.115

Based on estimated marginal means

a Adjustment for multiple comparisons: Bonferroni.

Table 5.69

*Chi-square Analyses of Experimental Groups' Answer Frequency in Lesson 1**Questionnaire*

Question	Test	Value	df	Asymp. Sig. (2-sided)
1	Pearson chi-square	8.553	9	0.479
	Likelihood ratio	8.244	9	0.51
2	Pearson chi-square	10.285	9	0.328
	Likelihood ratio	10.39	9	0.32
3	Pearson chi-square	3.669	6	0.721
	Likelihood ratio	3.179	6	0.786
4	Pearson chi-square	12.903	9	0.167
	Likelihood ratio	12.806	9	0.172.
5	Pearson chi-square	6.069	9	0.733
	Likelihood ratio	5.577	9	0.781
6	Pearson chi-square	5.869	9	0.753
	Likelihood ratio	5.423	9	0.796
7	Pearson chi-square	9.974	12	0.618
	Likelihood ratio	9.82	12	0.632

Table 5.70

*Chi-square Analyses of Experimental Groups' Answer Frequency in Lesson 2**Questionnaire*

Question	Test	Value	df	Asymp. Sig. (2-sided)
1	Pearson chi-square	11.257	9	0.259
	Likelihood ratio	12.092	9	0.208
2	Pearson chi-square	5.061	9	0.829
	Likelihood ratio	5.442	9	0.794
3	Pearson chi-square	7.854	9	0.549
	Likelihood ratio	8.071	9	0.527
4	Pearson chi-square	13.815	12	0.313
	Likelihood ratio	16.357	12	0.175
5	Pearson chi-square	15.256	12	0.228
	Likelihood ratio	17.927	12	0.118
6	Pearson chi-square	15.627	18	0.619
	Likelihood ratio	19.465	18	0.364
7	Pearson chi-square	9.468	12	0.663
	Likelihood ratio	12.138	12	0.435

Table 5.71

*Chi-square Analyses of Experimental Groups' Answer Frequency in Lesson 3**Questionnaire*

Question	Test	Value	df	Asymp. Sig. (2-sided)
1	Pearson chi-square	4.897	6	0.557
	Likelihood ratio	6.733	6	0.346
2	Pearson chi-square	6.536	6	0.366
	Likelihood ratio	8.754	6	0.188
3	Pearson chi-square	9.072	9	0.431
	Likelihood ratio	9.533	9	0.39
4	Pearson chi-square	6.546	9	0.684
	Likelihood ratio	8.842	9	0.452
5	Pearson chi-square	6.471	12	0.89
	Likelihood ratio	7.08	12	0.852
6	Pearson chi-square	9.47	12	0.662
	Likelihood ratio	10.161	12	0.602
7	Pearson chi-square	6.828	12	0.869
	Likelihood ratio	8.467	12	0.748

Table 5.72

*Chi-square Analyses of Experimental Groups' Answer Frequency in Lesson 4**Questionnaire*

Question	Test	Value	df	Asymp. Sig. (2-sided)
1	Pearson chi-square	3.649	6	0.724
	Likelihood ratio	3.784	6	0.706
2	Pearson chi-square	0.276	3	0.964
	Likelihood ratio	0.276	3	0.964
3	Pearson chi-square	3.967	6	0.681
	Likelihood ratio	4.726	6	0.579
4	Pearson chi-square	3.993	6	0.678
	Likelihood ratio	4.189	6	0.651
5	Pearson chi-square	11.131	6	0.084
	Likelihood ratio	12.842	6	0.046
6	Pearson chi-square	16.69	12	0.162
	Likelihood ratio	19.306	12	0.081
7	Pearson chi-square	14.703	9	0.099
	Likelihood ratio	18.83	9	0.027

**Appendix N: Percentage Tables for Participants' Answers to Lesson Retrospective
Questionnaire**

Table 5.73

Participants' Answers to Lesson 1 Retrospective Questionnaire

Question	Missing	A	B	C	D	E	NA	total
1	2%	35%	61%	2%	0%	0%	0%	100%
2	2%	70%	26%	2%	0%	0%	0%	100%
3	2%	65%	33%	0%	0%	0%	0%	100%
4	2%	30%	50%	19%	0%	0%	0%	100%
5	2%	11%	37%	50%	0%	0%	0%	100%
6	2%	11%	37%	50%	0%	0%	0%	100%
7	2%	19%	24%	15%	41%	0%	0%	100%

QUESTIONS & ANSWER CHOICES**(I. LEARNERS' INTEREST IN THE LESSON TOPIC AND USE OF TECHNOLOGY)**

1. The lesson theme was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

2. Overall, learning in this computerised environment that combines images, interactive sentences, coloured texts, etc., through the various tasks of the lesson was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(II. LEARNERS' INTEREST IN THE COMPLETION OF THE TENSE-ASPECT TASK)

3. The scrambled sentence interactive task was

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(III. LEXICAL DIFFICULTY)

4. Overall, vocabulary in the sentences of the scrambled sentence task was

- a) Very easy to understand
- b) Somewhat easy to understand
- c) Somewhat difficult to understand
- d) Very difficult to understand
- e) I did not understand some/many of the sentences

(IV. LEARNERS' PROCESSING OF THE SENTENCES OF THE MULTIMEDIA TENSE-ASPECT TASK)

5. To select the sentences in the scrambled sentence task

- a) I quickly read all the sentences
- b) I carefully read all the sentences
- c) I read all the sentences, paying special attention to verbs and their inflections
- d) I selected the sentences randomly
- e) None of the above

(V. LEARNERS' ATTENTION TO FEEDBACK DURING THE MULTIMEDIA TENSE-ASPECT TASK)

6. Overall, after reading the feedback questions that appeared when a wrong sentence was selected during the task completion, you went back to the task and

- a) quickly read all sentences
- b) carefully read each of the sentences, word by word
- c) read the sentences, paying special attention to the verbs and their inflections
- d) did not pay attention to the prompts
- e) did not pay attention to the prompts because I did not understand them

(VI. LEARNERS' APPRECIATION OF L2 AREAS THAT BENEFITED FROM THE MULTIMEDIA LESSON)

7. Overall, this computerised lesson helped you:

- a) increase your vocabulary
- b) understand some grammar structures
- c) improve your reading skills in French
- d) all of the above
- e) none of the above

Table 5.74

Participants' Answers to Lesson 2 Retrospective Questionnaire

Question	Missing	A	B	C	D	E	NA	total
1	6%	54%	39%	2%	0%	0%	0%	100%
2	6%	61%	32%	2%	0%	0%	0%	100%
3	6%	48%	44%	2%	0%	0%	0%	100%
4	6%	15%	43%	33%	0%	4%	0%	100%
5	6%	7%	54%	28%	6%	0%	0%	100%
6	6%	15%	54%	11%	9%	4%	2%	100%
7	6%	15%	22%	20%	37%	0%	0%	100%

QUESTIONS & ANSWER CHOICES**(I. LEARNERS' INTEREST IN THE LESSON TOPIC AND USE OF TECHNOLOGY)**

1. The lesson theme was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

2. Overall, learning in this computerised environment that combined audio, images, interactive sentences, coloured texts, etc., throughout the lesson was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(II. LEARNERS' INTEREST IN THE COMPLETION OF THE TENSE-ASPECT TASK)

3. The reconstruction writing task was

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(III. LEXICAL DIFFICULTY)

4. Overall, vocabulary in the sentences of the listening/reconstruction task was

- a) Very easy to understand
- b) Somewhat easy to understand
- c) Somewhat difficult to understand
- d) Very difficult to understand
- e) I did not understand some/many of the sentences

(IV. LEARNERS' ATTENTION TO FORM DURING THE COMPLETION OF THE MULTIMEDIA TENSE-ASPECT TASK)

5. During the text reconstruction task, how often did you pay attention to the appropriate use of French, for example, verbal inflections, prepositions, spelling, etc.?

- a) In all sentences
- b) In most of the sentences
- c) In some sentences
- d) Rarely
- e) In none of the sentences

(V. LEARNERS' ATTENTION TO FEEDBACK DURING THE MULTIMEDIA TENSE-ASPECT TASK)

6. How frequently did you and your partner negotiate the proper use of French (spelling, verb inflection, prepositions, etc.) during the text reconstruction task?

- a) In all sentences
- b) In most sentences
- c) In some sentences
- d) Not often
- e) In none of the sentences

(VI. LEARNERS' APPRECIATION OF L2 AREAS THAT BENEFITED FROM THE MULTIMEDIA LESSON)

7. This lesson in general helped you

- a) increase your vocabulary
- b) understand some grammar structures
- c) improve your reading skills in French
- d) all of the above
- e) none of the above

Table 5.75

Participants' Answers to Lesson 3 Retrospective Questionnaire

Question	Missing	A	B	C	D	E	NA	total
1	7%	83%	9%	0%	0%	0%	0%	100%
2	7%	82%	11%	0%	0%	0%	0%	100%
3	7%	59%	32%	2%	0%	0%	0%	100%
4	7%	7%	63%	22%	0%	0%	0%	100%
5	7%	20%	37%	33%	2%	0%	0%	100%
6	7%	33%	37%	20%	0%	0%	2%	100%
7	7%	28%	20%	13%	32%	0%	0%	100%

QUESTIONS & ANSWER CHOICES**(I. LEARNERS' INTEREST IN THE LESSON TOPIC AND USE OF TECHNOLOGY)**

1. The lesson theme was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

2. Overall, learning in this computerised environment that combined video, interactive sentences, coloured texts, images, etc., through the various tasks of the lesson was

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(II. LEARNERS' INTEREST IN THE COMPLETION OF THE TENSE-ASPECT TASK)

3. The true/false video-watching task was

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(III. LEXICAL DIFFICULTY)

4. Overall, vocabulary in the sentences of the scrambled sentence task was

- a) Very easy to understand
- b) Somewhat easy to understand
- c) Somewhat difficult to understand
- d) Very difficult to understand
- e) I did not understand some/many of the sentences

(IV. LEARNERS' PROCESSING OF THE SENTENCES OF THE MULTIMEDIA TENSE-ASPECT TASK)

5. Prior to watching the video, you were given 4 sentences. How did you read them?

- a) Quickly
- b) Carefully, word by word
- c) Carefully, paying special attention to verbs and verbal inflections
- d) I did not pay much attention to the sentences
- e) None of the above

(V. LEARNERS' ATTENTION TO FEEDBACK DURING THE MULTIMEDIA TENSE-ASPECT TASK)

6. You were given feedback in the form of questions on all your answers during the video task. How did you read these feedback sentences?

- a) Quickly
- b) Carefully, word by word
- c) Carefully, paying special attention to verbs and verbal inflections
- d) I did not pay attention to the sentences
- e) I did not understand some of the sentences, and thus, did not pay much attention to them

(LEARNERS' APPRECIATION OF L2 AREAS THAT BENEFITED FROM THE MULTIMEDIA LESSON)

7. This lesson in general helped you

- a) increase your French vocabulary
- b) understand the use of some grammar structures
- c) improve your reading comprehension
- d) all of the above
- e) none of the above

Table 5.76

Participants' Answers to Lesson 4 Retrospective Questionnaire

Question	Missing	A	B	C	D	E	NA	total
1	0%	65%	33%	2%	0%	0%	0%	100%
2	0%	56%	44%	0%	0%	0%	0%	100%
3	0%	54%	43%	4%	0%	0%	0%	100%
4	0%	13%	65%	22%	0%	0%	0%	100%
5	0%	15%	74%	11%	0%	0%	0%	100%
6	0%	20%	43%	26%	4%	7%	0%	100%
7	0%	9%	50%	9%	32%	0%	0%	100%

QUESTIONS & ANSWER CHOICES**(I. LEARNERS' INTEREST IN THE LESSON TOPIC AND USE OF TECHNOLOGY)**

1. The lesson theme was:

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

2. Overall, learning in this computerised environment that combined images, interactive sentences, coloured texts, etc., through the various tasks of the lesson was

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(II. LEARNERS' INTEREST IN THE COMPLETION OF THE TENSE-ASPECT TASK)

3. The guided writing task

- a) Very interesting
- b) Interesting
- c) Not interesting
- d) Boring
- e) Very boring

(III. LEXICAL DIFFICULTY)

4. Overall, vocabulary in the writing task was

- a) Very easy to understand
- b) Somewhat easy to understand
- c) Somewhat difficult to understand
- d) Very difficult to understand
- e) I did not understand some/many of the sentences

(IV. LEARNERS' ATTENTION TO FORM DURING THE COMPLETION OF THE MULTIMEDIA TENSE-ASPECT TASK)

5. During the newspaper article writing task, how often did you pay attention to the appropriate use of French, for example verbs, verbal inflections, prepositions, spelling, etc.?

- a) In all sentences
- b) In most of the sentences
- c) In some of the sentences
- d) Rarely
- e) In none of the sentences

(V. LEARNERS' ATTENTION TO FEEDBACK DURING THE MULTIMEDIA TENSE-ASPECT TASK)

6. How frequently did you and your partner negotiate the proper use of French (spelling, verb inflection, prepositions, etc.) during the newspaper writing task?

- a) In all sentences
- b) In most sentences
- c) In some sentences
- d) Not often
- e) In none of the sentences

(VI. LEARNERS' APPRECIATION OF L2 AREAS THAT BENEFITED FROM THE MULTIMEDIA LESSON)

7. Overall, this computerised lesson helped you:

- a) increase your vocabulary
- b) understand some grammar structures
- c) improve your reading skills in French
- d) all of the above
- e) none of the above