

University of Groningen

## Neurolinguistic and psycholinguistic approaches to studying tense, aspect, and unaccusativity

Čordalija, Nermina

DOI:  
[10.33612/diss.174043776](https://doi.org/10.33612/diss.174043776)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2021

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*  
Čordalija, N. (2021). *Neurolinguistic and psycholinguistic approaches to studying tense, aspect, and unaccusativity*. University of Groningen. <https://doi.org/10.33612/diss.174043776>

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

**Neurolinguistic and psycholinguistic approaches to  
studying tense, aspect, and unaccusativity**

**PhD thesis**

The research reported in this thesis has been carried out under the auspices of the Centre for Language and Cognition Groningen (CLCG) of the Faculty of Arts at the University of Groningen and the School for Behavioral and Cognitive Neurosciences (BCN) of the University Medical Center Groningen.

Publication of this thesis was financially supported by the University of Groningen.



Groningen Dissertations in Linguistics 204

© 2021, Nermina Čordalija

Cover Design: Vedad Čordalija

Layout: Matea Tolić

Printing: Ipskamp Printing (NL), [www.ipskampprinting.nl](http://www.ipskampprinting.nl)

# **Neurolinguistic and psycholinguistic approaches to studying tense, aspect, and unaccusativity**

**PhD thesis**

to obtain the degree of PhD at the  
 University of Groningen  
 on the authority of the  
 Rector Magnificus Prof. C. Wijmenga  
 and in accordance with  
 the decision by the College of Deans.

This thesis will be defended in public on

Tuesday 29 June 2021 at 16.15 hours

by

**Nermina Čordalija**

born on 23 March 1989  
 in Sarajevo, Bosnia and Herzegovina

**Supervisor**

Prof. Y.R.M. Bastiaanse

**Co-supervisor**

Dr. S. Popov

**Assessment committee**

Prof. C.J.W. Zwart

Prof. N. Friedmann

Prof. S. Halupka-Rešetar

**Acknowledgements**

My PhD journey at Rijksuniversiteit Groningen has given me the privilege to learn from and work with great experts and to meet inspiring people in various segments of academia. I was given an opportunity to develop skills in the fields of neurolinguistics and psycholinguistics.

That opportunity was given to me first and foremost by my promotor and supervisor prof.dr. Roelien Bastiaanse. Nothing I write here will adequately express my gratitude to you for believing in me from the very beginning - from the moment you selected me to come to Groningen. You and my second supervisor, dr. Srđan Popov, guided me through all the phases of this PhD project and read the dissertation so many times providing me with valuable feedback and advice. All along, both of you offered all the help I needed professionally but you also supported me in very challenging times.

Professor Bastiaanse, your professional investment but also you motherly and selfless love and care is what made me persevere and thrive. Thank you. Srđan, your supervision has been of utmost help in building my career. I learned so much from you and I look up to you professionally. But what I endlessly appreciate is the professional relationship we built. On one occasion in 2017, you said that you understand me and that you would support me in whatever my decision was back then. That support and empathy have never ceased to exist. I really look forward to our future collaboration. Professor Bastiaanse and Srđan, I would not be here today had it not been for the two of you. In addition to being absolute stars in the world of science, you make others' lives more beautiful and more meaningful. Rare are the ones in and outside academia that have the soul to do that. My life is so much richer for having met you.

I would also like to express my gratitude to all the former and current members of the Neurolinguistics and Language Development research group at the University of Groningen. Some of you I know well because we shared all the stressful and happy moments at winter and summer schools. Some of you I met only recently and mostly online. Nevertheless, from you, I learned about experimental methodology, statistical models, processing of language, neurobiology of language, aphasia, apraxia of speech, ERPs, presenting skills and so on. It is

my great privilege to have met you and have learned from you. Thank you Aida Salčić and Toivo Glatz for helping me record the auditory stimuli in 2017 and Toivo for introducing me to Praat. Thank you Ines Tokmačić for your amazing help with performing the ERP experiment and designing the stimuli. Thank you, Pauline, for translating my summary to Dutch. It really means the world to me that you took your time to help me. Thank you, Aida, for all the advice and help when I was moving to Groningen and generally, for being a person of trust, a person I can always get in touch with and feel understood. Thank you for helping me move on that rainy day when you were actually ill, but still came and helped me. Such selfless acts of kindness are not frequently found in the world around us. I think you implicitly (and now explicitly) know how much I respect and love you. Thank you, Nat, for your beautiful spirit and kindness that I feel whenever we have a chance to meet. Thank you, Svetlana, for a beautiful friendship that we can always go back to regardless of the distance between us. It is a blessing to have you as a friend. You are my Russian sister and a friend soulmate. I really hope you will always be aware of the uniqueness, purity and goodness of your soul. I am so grateful to have met you. Without a single word, we always understood each other, like we've known each other for an eternity. You are so special to me Svetlana.

It is my honor to have conducted my PhD project at Rijksuniversiteit Groningen. Academic and non-academic staff (such as Alice Pomstra, Christina Englert, and Marijke Wubbolts for example) have all touched my life in an inspirational way. Thank you for every presentation, conference, statistics course, ethics course, every LOT school, EMLAR workshop I attended. All of that led me here. Thank you, Alice, for your help and support from the very start of the program. Thank you, Alice, for being my paranymph and helping me with all the technical aspects of the final stages of the program.

I am also grateful to the reading committee and the examination committee for taking time to read and assess my thesis. Thank you, Professor Halupka-Rešetar, Professor Zwart, Professor Friedmann, dr. Dragoy, dr. Hollebrandse, and dr. Jonkers. I am honored to have you in my committees.

Even though I am not finishing this journey as an IDEALAB student, that is how I started it in 2016, so I would like to thank IDEALAB directors, prof. dr. Barbara Höhle, prof.

dr. Lyndsey Nickels, prof. dr. David Howard and prof. dr. Gabriele Miceli as well as PhD candidates at the time and Anja Papke for giving me the opportunity to be part of that amazing story, to travel to Macquarie University, the University of Potsdam and get acquainted with MEG, fMRI, EMOTIV and so on. From my perspective, you have given me the world of opportunities.

I would also like to express my gratitude to the English language and literature department at the University of Sarajevo. I would like to thank all of you for the opportunity to get teaching experience in subjects I am passionate about. I am especially grateful to prof. dr. Nedžad Leko, prof. dr. Merima Osmankadić, prof. dr. Selma Đuliman and doc. dr. Nejlja Kalajdžisalihović with whom I collaborate on different subjects, for the many things I have learned from you. I look forward to many years of our future collaboration. Thank you prof. dr. Amira Sadiković for obtaining the permission to test students. Thank you prof. dr. Larisa Kasumagić-Kafedžić for a beautiful spirit that I find inspirational. Thank you prof. dr. Selma Đuliman for kindness and empathy when they meant the world to me. Thank you prof. dr. Merima Osmankadić for the support and taking over the practicals and many other things you did to make this entire process easier. Thank you prof. dr. Saša Drače for conversations on methodology.

Thank you Matea Tolić, Ina Barić and Tamara Butigan for being so trustworthy and supportive. It is my honor to plan research projects and experiments with you. Thank you, Ina, for understanding the struggles and the existential dilemmas. It feels not so alone. Berlin has never felt closer. For hours on Zoom. And for Netflix of course. Thank you, Matea, for all the help with the preparation for the defense and for being there all along.

I am especially grateful to my first supervisor who introduced me to the world of generative grammar that sparked my love for linguistics – prof. dr. Nedžad Leko. You played a decisive role in me choosing a linguistic career, gave me advice on writing the research proposal, designing the stimuli, teaching but also for being supportive all along. You introduced me to the EMSS project. We wrote papers together, conducted experiments together. You heartily supported my coming to UNSA as a teaching assistant. We might not have agreed on everything but it was my honor to have you as a professor, supervisor, now a

colleague and generally, a person of trust. Thank you, I endlessly appreciate your support and presence in my life.

I would also like to thank the EMSS project partners who introduced me to the field of psycholinguistics, gave me the opportunity to learn and the privilege to be part of such an important project immediately after receiving my MA degree. Boban Arsenijević, Anita Peti Stantić, Marijana Kresić and Jana Willer Gold were also acquainted with some important life choices I had to make in the beginning of my PhD studies and made time to listen to me and give me advice. It has been an absolute pleasure to work with you. Lanko Marušić and Andrew Nevins were kind enough to read my project proposal back in 2015. I am grateful to Nadira Aljović for her feedback on unaccusativity and openness to, in her words, thinking together.

In this journey, I was also inspired by students. Many of you were interested in my work and took time to listen to me and even those who were not, your presence at the practicals during what were sometimes very difficult times for me, brought beauty to those days. Most importantly, thank you for the honesty and openness. You always thank me for introducing you to different concepts but I would like to thank you for the many things I learned from you and for all those noble feelings you have awoken in me. Thank you, generations 2016, 2017, 2018, 2019, 2020 at English and Psychology departments. I enjoyed every single one of those sessions we had over those 4 years and was inspired by you over and over again. I am especially grateful to Kerim Salihagić who helped me with the self-paced reading experiment. I am also immensely grateful to Almedina Smajlović, Emil Lika and Ernad Mahmić for their help with experimental work in 2018 and 2019.

While I was staying in Berlin in 2016 especially supportive were Amel Mekić, Tajra Mekić and Arijana Nurković. I recall vividly our phone conversations, Arijana. I still keep Tajra's drawings with me. I cannot even start to explain how much your support meant to me. Thank you, all three of you, for the love and empathy back then.

I also cherish how gently and empathically my former students and their parents said farewell to me in 2016. Thank you Adna, Asija, Adisa, Vilma, Helena, Mihaela, Ivana, Robert, Ajla, Ena, Nerma, Ilma, Asja, Hanan, Aida, Lana (and the grandma), Mirela, Arman, Azra,

Lut, Dalila, Harun, Lejla, Ammar, Ajla, Ivana, Zvonka, Jesenka, Ena, Mirela for the beautiful emotions.

In the end, even though I tried to keep the professional and private life apart, my family (immediate and extended) and a few persons of trust have endured all the aspects of my journey so far. Throughout all these years, there never was a single moment that I did not feel loved and respected. Thank you for your presence in my life. I don't have to name you, you will recognize yourselves in these words as you were with me all along. It would be actually be very difficult not to leave someone out. But to families Čordalija and Tulović, I hope this thesis does you proud.

In 2011, a few months before I earned my MA degree, my granda Đemila passed away. I hope you find it in your heart to forgive me. There is nothing that I regret more in life. My uncle Mujo passed away in 2017 and aunt Rahima in 2019. This thesis is in the loving memory of the three of you. I remember September 2016 when I was leaving for Berlin. My uncle, aunt, Vedina, and Edin were there. Especially vividly, I remember that morning I left, when my uncle and aunt and parents and brother said farewell to me. I was never more heartbroken than on that day. Thank you for the care and love.

I am very grateful to Emina and Fadil in Enschede who treated me like their own child back in 2016. Ajša and Hatidža, all the I love you-s you said meant the world to me. Thank you, Alisa, for the purity and innocence. It is reassuring to know that people like you exist.

For those whose suffering I witnessed, I hope you find peace. Be the love you didn't receive.

I dedicate this thesis to my parents and my brother. You invested your lives in helping me become who I am today. Our love is unconditional, pure and cannot be expressed in words. You give meaning to everything.

I might have left Groningen but Groningen and The Netherlands have a very special place in my heart. I always felt an absolute compatibility with the spirit of Groningen. It is my utter privilege to become a RUG alumnus.

*You are so brave and quiet I forget that you are suffering.*

Ernest Hemingway

## Table of Contents

<i>CHAPTER 1 GENERAL INTRODUCTION</i> .....	15
1.1 <i>Introduction</i> .....	16
Topic and aims of the PhD project.....	16
Organization of the dissertation .....	17
1.2 <i>Tense and grammatical aspect: General observations</i> .....	18
1.3 <i>Tense</i> .....	20
1.3.1 Realization .....	20
1.3.2 Function .....	22
1.4 <i>Aspect</i> .....	24
1.4.1 Lexical aspect.....	24
1.4.2 Grammatical aspect: Classical definitions and challenges .....	25
1.4.3 Grammatical aspect systems .....	27
1.4.4 Grammatical aspect in Bosnian/Croatian/Serbian (BCS).....	28
Realization.....	29
Function.....	33
1.4.5 Grammatical aspect systems: English versus BCS aspect.....	35
1.5 <i>Interim summary</i> .....	39
1.6 <i>Aspect and unaccusativity</i> .....	39
1.6.1 The difference between unergativity and unaccusativity.....	40
1.6.2 Unaccusativity and its tense and aspect preferences.....	40
1.7 <i>Relevant theoretical considerations in a nutshell</i> .....	43
1.8 <i>Experimental methodology of the PhD project</i> .....	45
Self-paced reading.....	45
Event-related potentials.....	46
Cross-Modal Lexical Priming .....	47
1.9 <i>Research questions</i> .....	49
<i>CHAPTER 2 ONLINE AND OFFLINE PROCESSING OF TENSE AND ASPECT VIOLATIONS</i> .....	51
2.1 <i>Introduction: Theoretical observations on tense and aspect</i> .....	53
2.1.1 Tense: Theoretical considerations essential to the SPR experiment.....	55
2.1.2 Grammatical aspect: Theoretical considerations essential to the SPR and the ERP experiments .....	58
English versus BCS aspect: A contrast .....	63
2.1.3 Interim summary .....	65
2.1.4 Neuro- and psycholinguistic studies on tense processing.....	65
2.1.5 Neuro- and psycholinguistic studies on aspect processing .....	70
2.1.6 Interim summary .....	72
2.1.7 The present study: Research questions and expectations.....	72
The self-paced reading experiment: The time course of processing tense and aspect .....	76
2.2 <i>Methods [The self-paced reading experiment]</i> .....	76
2.2.1 Participants.....	76
2.2.2 Materials and design .....	76

2.2.3	Procedure .....	79
2.2.4	Data analysis .....	80
2.3	<i>Results</i> .....	82
2.3.1	Tense violations .....	82
2.3.2	Aspect violations .....	83
2.3.3	Online versus offline data .....	83
2.4	<i>Methods [The ERP experiment]</i> .....	86
2.4.1	Participants .....	86
2.4.2	Materials and design .....	86
2.4.3	Procedure .....	88
2.4.4	EEG recordings and data processing .....	88
2.4.5	Data analysis .....	89
2.5	<i>Results</i> .....	90
2.5.1	Behavioral data .....	90
2.5.2	ERP data .....	90
2.6	<i>Discussion</i> .....	93
2.6.1	Tense .....	93
2.6.2	Aspect .....	97
2.6.3	English versus BCS aspect: Differences in processing .....	100
2.6.4	Tense and aspect processing compared .....	101
<i>CHAPTER 3 ASPECT AND UNACCUSATIVITY: A CROSS-MODAL LEXICAL PRIMING STUDY</i> .....		
3.1	<i>Introduction</i> .....	104
3.1.1	Unergativity and Unaccusativity .....	104
3.1.2	Aspect in Bosnian/Croatian/Serbian (BCS) .....	107
3.1.3	Unaccusativity, time reference, telicity and aspect .....	108
3.1.4	Interim summary .....	112
3.1.5	Neuro- and psycholinguistic studies on unaccusativity .....	112
3.1.6	Unaccusativity in English .....	113
3.1.7	The present study: Research questions and expectations .....	115
3.2	<i>Method</i> .....	116
3.2.1	Participants .....	116
3.2.2	Materials and Design .....	116
3.2.3	Procedure .....	119
3.2.4	Data analysis .....	119
3.3	<i>Results</i> .....	120
3.4	<i>Discussion</i> .....	123
3.4.1	Unergativity versus unaccusativity .....	123
3.4.2	Interaction Unaccusativity x Aspect .....	124
3.4.3	Activation or re-activation? .....	125
3.4.4	The issue of imperfectivity .....	125
3.4.5	English and BCS unaccusatives compared .....	127
<i>CHAPTER 4 GENERAL DISCUSSION AND CONCLUSIONS</i> .....		
4.1	<i>Introduction</i> .....	130
4.2	<i>Tense and aspect are intrinsically related, yet, tense and aspect violations show different processing patterns</i> .....	130

4.3	<i>There is an interplay between perfective aspect and unaccusativity</i> .....	134
4.4	<i>Lexical access of semantically ambiguous verb forms</i> .....	136
4.5	<i>Limitations and suggestions for future research</i> .....	138
Appendix 1: Sentences for the two experiments described in Chapter 2 .....		140
Appendix 2: Sentences for the experiment described in Chapter 3 .....		150
References .....		163
Summary .....		183
Nederlandse samenvatting .....		186
Groningen Dissertations in Linguistics (GRODIL) .....		189