

Term Paper

|  |
| --- |
| **The Warrior Stabs the Goat: Creating a Dothraki Resource Grammar with Grammatical Framework** |

**Maria Henkel**

2008709 • maria.henkel@hhu.de

**Benno Kuckuck**

000000 • benno.kuckuck@hhu.de

October 17th, 2016

|  |  |
| --- | --- |
| **Lecturers:** | Yulia Zinova, Rainer Osswald |
| **Course:** | Introduction to "Grammatical Framework"  SS 2016 |

# Contents

[Contents I](#_Toc462654585)

[List of Figures II](#_Toc462654586)

[List of Tables II](#_Toc462654587)

[1. Introduction 1](#_Toc462654588)

[2. Theory and Methods 2](#_Toc462654589)

[2.1 Planning and Execution of the Project 2](#_Toc462654590)

[2.2 Dothraki Grammar 2](#_Toc462654591)

[2.3 Project Structure 2](#_Toc462654592)

[2.4 Problems and Solutions 2](#_Toc462654593)

[3. Results 2](#_Toc462654594)

[4. Discussion 2](#_Toc462654595)

[4.1 Limitations 2](#_Toc462654596)

[4.2 Outlook 2](#_Toc462654597)

[4.3 Conclusion 2](#_Toc462654598)

[Appendix 4](#_Toc462654599)

[Source Code 4](#_Toc462654600)

[References 4](#_Toc462654601)

[Eidesstattliche Erklärung 6](#_Toc462654602)

## List of Figures

**Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.**

## List of Tables

[Table 1: Translation Examples 1](#_Toc462592579)

**

“That woman which will stink has

stinked behind that tree.”

GF Run-Time System, 2016

## Introduction

Grammatical Framework (GF) is a functional programming language, created in 1998 (Ranta, 2011) and designed to write (natural) language grammars. Since GF is “working from a language-independent representation of meaning” (Wikipedia, 2016) it can be used to generate or parse text in different languages at the same time. One of its functions is to translate between languages.

Since GF uses a symbolic approach to process and translate language, in many cases its translations are more precise than those of statistical tools we use in everyday life (Brown & Frederking, 1995). For example, the “Google Translate” service (Google, 2016) will produce ungrammatical sentences as soon as the input is too complicated while the GF translator (Grammatical Framework, 2016) has no problems producing a correct translation (see Table 1).

Table 1: Translation Examples

|  |  |  |
| --- | --- | --- |
| Input | Output Google Translate | Output GF Translator |
| I heal these women. | Ich diese Frauen zu heilen. | |  |  | | --- | --- | |  | Ich verheile diese Frauen. | |
| The warrior will kiss that cheese behind the tree. | Der Krieger wird Kuss, der Käse hinter dem Baum. | Der Krieger wird jenen Käse hinter dem Baum küssen. |
| Diese heiße Frau ersticht diese Königin im Meer. | This hot woman heals the queen of the sea. | This hot woman heals this queen in the sea. |

This also means, that GF – other than Google Translate – depends on a large knowledge base of predefined grammar rules to achieve high-quality language processing: Its own standard library, the GF Resource Grammar Library, covers more than 38 different languages (Ranta, 2015) and is still growing (although many of them are not yet complete). In 2010, it already consisted of more than 500,000 lines of code (Ranta, 2011). As Grammatical Framework is an open-source project, and still under development, everyone is invited to use it or even help further develop it. For example, by adding languages to the library, which is the aim of the project described in this paper.

Our goal is to write a GF resource grammar for the Dothraki language and, eventually, be able to add it to the GF Resource Grammar Library.

It is a constructed language, developed by the language creator and writer David J. Peterson (Peterson, 2016a). The Dothraki are a fictional race of nomadic horse warriors in the “A Song of Ice and Fire” book series by George R. R. Martin (Martin, 2016). As the series was adapted for television by the television network HBO, the language bits found in Martin’s books had to be extended to a fully functional language (Peterson, 2016b): The Dothraki language. Today, it has a vocabulary of over 3,000 words (Tongues of Ice and Fire Wiki, 2016). We will show a few examples of the Dothraki language grammar in this paper, but more information can be found in the book “Living Language Dothraki” (Peterson, 2014), on Peterson’s blog (2016b) and on the Tongues of Ice and Fire Wiki (2016) among many other sources.

This paper aims to serve as a short documentation and explanation of our project. It will cover the project aim and scope, general information regarding the project as well as its structure and explanations of sample functions and the corresponding Dothraki grammar rules (Chapter 2). We will also discuss problems and limitations and briefly describe future plans before we summarize and evaluate the project in its current state and our experience while working on it (Chapter 4).

## Project

### General Information

Planning, execution, aim, scope, blabla

Git hub <https://github.com/GrammaticalFramework> <https://github.com/mahen2/dothraki_gf>

Comments im Quellcode?

### Program Structure

Structure, Summary of all Functions and examples with language explanation

### Problems and Solutions (to Limitations section?)

## Discussion

### Limitations

Since .. language… a complicated and lengthy task,

### Outlook

Expand grammar to a full resource grammar.

### Conclusion

## Appendix

### Source Code

The complete source code can be viewed and downloaded on GitHub:

<https://github.com/mahen2/dothraki_gf>

### References

Brown, R., & Frederking, R. (1995). Applying statistical English language modeling to symbolic machine translation. In *Proceedings of the sixth international conference on theoretical and methodological issues in machine translation (TMI-95)* (pp. 221-239).

Google (2016). *Google Translate*. Retrieved from <https://translate.google.com/>

Grammatical Framework (2016). Translation with GF: Powered by multilingual grammars. Retrieved from <http://www.grammaticalframework.org/demos/translation.html>

Martin, G. R. R. (2016). Bibliography. Retrieved from http://www.georgerrmartin.com/bibliography/

Peterson, D. J. (2014). *Living Language Dothraki: A Conversational Language Course Based on the Hit Original HBO Series Game of Thrones*. New York: Living Language.

Peterson, D. J. (2016a). *The Art of Language Invention*. Retrieved from <http://www.artoflanguageinvention.com/>

Peterson, D. J. (2016b). About Dothraki. Retrieved from <http://www.dothraki.com/about-dothraki/>

Ranta, A. (2011). *Grammatical Framework: Programming with Multilingual Grammars.* Stanford: CSLI Publications.

Ranta, A. (2015). *The Status of the GF Resource Grammar Library.* Grammatical Framework. Retrieved from <http://www.grammaticalframework.org/lib/doc/status.html>

Tongues of Ice and Fire Wiki (2016). Vocabulary. Retrieved from http://wiki.dothraki.org/Vocabulary

Wikipedia (2016). Grammatical Framework. Retrieved from https://en.wikipedia.org/wiki/Grammatical\_Framework

## Versicherung

Hiermit versichern wir, diese Arbeit selbständig verfasst und keine anderen als

die angegebenen Quellen benutzt zu haben. Wir versichern ferner, dass diese

Arbeit oder Teile davon nicht schon für eine andere Abschlussprüfung oder einen anderen Beteiligungsnachweis eingereicht wurden. Uns ist bewusst, dass ein Zuwiderhandeln gegen diese Versicherung eine Ordnungswidrigkeit darstellt, die mit einer Geldbuße geahndet werden kann.

Düsseldorf, den 17.10.2016

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_