# Bar-Hillel Theorem mechanization in Coq*

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## Abstract

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***Keywords*** Formal languages, Coq, Bar-Hillel, closure, intersection, regulalr language, context-free language

## 1 Introduction

Language intersection problem is a foundation in many areas. It is the well-knon fact tat context-free languages are closed under intersection with regular languages. Theoretical result is Bar-Hillel [1] theorem which provide construction for resulting langugae description. Foundation in some areas: graphs, code analysis, etc.

Bar-Hillel theorem is a main on .

Mechanization (formalization) is important and many work done on formal languages theory mechanization.

Short overview of current results.

The main contribution of this paper mai be summarized as follows.

- We Bar-Hillel theorem in Coq.
- We generalize Smolka's CFL results: terminals is abstract types....
- ...

## 2 Related Work

All results you use in your work. All relevant results in this field (excluded this work). Smolka, smb else [2–4].

As a result of this section we should conclude, that (1) this problem is open (2) it is important to solve this problem.

## 3 Bar-Hillel Theorem

Original B-H theorem and proof which we use as base.

## 4 CNF

Seems that we should discuss CNF and its proof.

## 5 B-H in Coq

Main part. All code are published on GitHub [1] What did you do and how. And, possible, why. Problems, nontrivial solutions, stc.

### 5.1 Smolka's code generalization

First we nwwd to generalize code of ...

### 5.2 General scheme of proof

General scheme of our proof is based on constructive proof presented by [? ]

### 5.3 Part one: regular language and automata

First step is !!!!

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†with subtitle note
‡with author1 note
§with author2 note

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[1] https://github.com/YaccConstructor/YC_in_Coq

### 5.4 Part two

### 5.5 Part N: final step

Finally we should proof main statement!

## 6 Conclusion

Short resume of main part (main results formulation). We present mechanization of Bar-Hillel theorem on closure of contex-free languages under intersection with regular.

Other algorithms on regular and context-free languages intersection. One of direction of future reserch is mechanization of practical algorithms which are just implementation of Bar-Hillel theorem. For example, context-free path querying algorithm, based on GLL [6] parsing algorithm [5].

Other problems on language intersection.

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## A Appendix

Text of appendix ...