# Modelling Cognition

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**Abstract**

*Cognition is a system wherein components of the language are public to the language itself. It is written in pure postfix notation, and removes the prefix characteristics of other similar languages. This enables the Cognition interpreter to be able to manipulate its state based on code read on the fly in a token stream, giving it the property of tokenizing and parsing future characters differently than it does current characters. The result is an unopinionated language that can replicate a wide variety of different syntaxes, allowing Cognition to modify syntax entirely during runtime. This paper investigates the implications of this system, which has potential applications in parsing and self-modifying systems.*

## 1 Introduction

Current programming languages operate with parsing requirements. This means that the parser must read ahead of the current token to decide what to do with the current token being passed into the parser. This usually causes the langauge to have a static syntax, due to the parser being too rigid for the AST to be made public. Metaprogramming languages solve this problem by making parts of the AST public, and in particular, concatenative programming languages such as forth, factor, and stem solve a part of this problem by introducing postfix notation for symbols usually known as *words*, which reduce the need for parsing by allowing tokens to be evaluated one-at-a-time. Many of these languages then utilize metaprogramming in order to alter the execution order of the tokens, usually using quotes. However, they don't remove the requirement of *reading ahead*. Instead, they outsource this process to quotes, which are required for turing completeness in the form of recursion. Worse, many of these languages have strings, which require the parser or tokenizer to read ahead in order to package the string as a single token. Therefore, many of these languages are not perfect candidates for a perfectly postfix language.

Cognition solves this problem using three mechanisms: first, tokens are one character long by default and information about how Cognition will tokenize based on certain delimiter rules are made public to the language; second, Cognition uses a unique metacrank system which allows it to modify the execution order of the code, allowing Cognition to *simulate* reading ahead, and allow for metaprogramming; third, it uses what we call an *falias* system which we believe to be computationally equivalent to metacrank, but makes for easier bootstrapping to an environment that is more desirable to program in.

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## 2 Methodologies

### 2.1 Sample Sites & Processing

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This is a bullet point list:

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*Corresponding author: matthewhinton@uvic.ca
†Corresponding author: preston@nullring.xyz

[1] Example footnote text.

- Arcu eros accumsan lorem, at posuere mi diam sit amet tortor
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## 2.2 Species Identification

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## 2.3 Data Analysis

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**Table 1:** *Example single column table.*

| Location | | |
|---|---|---|
| East Distance | West Distance | Count |
| 100km | 200km | 422 |
| 350km | 1000km | 1833 |
| 600km | 1200km | 890 |

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# 3 Results

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Referencing a figure using its label: Figure 1.

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**Table 2:** *Example two column table with fixed-width columns.*

| Location | | |
| East Distance | West Distance | Count |
|---|---|---|
| 100km | 200km | 422 |
| 350km | 1000km | 1833 |
| 600km | 1200km | 890 |



**Figure 1:** *Anther of thale cress (Arabidopsis thaliana), fluorescence micrograph. Source: Heiti Paves, https://commons.wikimedia.org/wiki/File:Tolmukapea.jpg.*

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## 3.1 International Support

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## 3.2 Links

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# 4  Discussion

This statement requires citation [**Smith:2023qr**]. This statement requires multiple citations [**Smith:2023qr**, **Smith:2024jd**]. This statement contains an in-text citation, for directly referring to a citation like so: **Smith:2024jd**.

## 4.1 Subsection One

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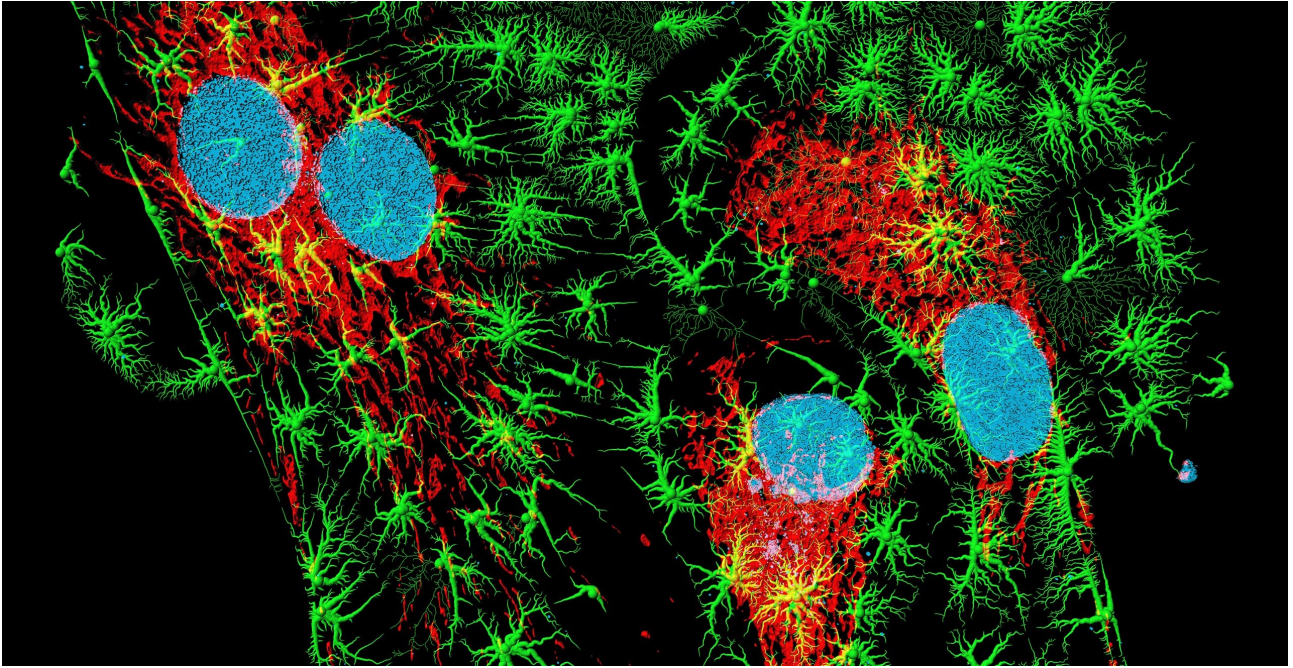
**Figure 2:** *Bovine pulmonary artery endothelial cells in culture. Blue: nuclei; red: mitochondria; green: microfilaments. Computer generated image from a 3D model based on a confocal laser scanning microscopy using fluorescent marker dyes. Source: Heiti Paves, https://commons.wikimedia.org/wiki/File:Fibroblastid.jpg.*

## 4.2 Subsection Two

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