

## ***Interpreter*** **A Transfer-Based English-Latin Translator**

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*Ad maiorem Dei gloriam inque hominum salutem.*

### **Abstract**

*This paper will exposit the design and implementation of Interpreter, a machine translator from English to Latin. Synthesizing a number of existing natural language processing tools and libraries, the application analyzes the grammatical structure of the source text in order to deliver translations into the morphologically rich Latin language with superior accuracy. The purpose of Interpreter is to redress the unavailability of reliable machine translation into Latin relative to other more commonly used languages. The author expects such to be of special interest to classicists, linguists, digital humanities specialists, hobbyists, and devotees of traditional Catholicism.*

*Repository available at <https://github.com/mpenza19/Interpreter/>.*

## 1. Introduction – *Introductio*

Machine translation is a technology with a broad appeal, allowing users to communicate across geographical, political, and cultural boundaries. Thanks to the likes of Google, whose translation service is freely available to anyone with an internet connection, automated translation is ubiquitous. Choose any pair of modern languages, and a serviceable, if imperfect, translation will typically result.

Classical languages, however, do not fair nearly as well. Google Translate, for example, nominally supports Latin, but the results are abysmal to the point of unintelligibility. This is caused in part by limited availability of data and substantially lower general interest in classical languages than that enjoyed by globally spoken, modern languages. The result is a frustrating experience for the user as the translator fails to accomplish its goal.

*Interpretor* aims to fill this gap, allowing non-Latinists to generate intelligible Latin translations of English text.

## 2. Background – *De radicibus*

"These words must be translated, but they will not have been translated well."

1. Haec verba transferenda sunt, sed solum translata erunt recte ab uno interprete.
2. Haec vocabula interpretanda sunt, at solo interpretata erunt recte ab uno translatore.
3. Haec verba interpretanda sunt, sed recte translata erunt a solo uno interprete.

Any of the above three renderings would be an acceptable translation of the original English. Surely even more variations are plausible, all conveying more or less the same semantic meaning, in syntactically and grammatically similar ways. What we have from Google Translate, however, is this:

Haec verba translata sit, sed non sunt atque translati.

This would be approximately rendered English as: "These words [neuter], let it [feminine] be translated, but they [masculine] are not and translated."

Let us briefly explore some of the problems with this translation. Most obviously, the genders of the nouns, adjectives, and participles are all mismatched, despite referring to the same thing (*Haec verba*). The number of *sit* is singular, whereas it should be plural to match *Haec verba*. The sense of necessity is reduced to a mere suggestion or wish by the use of the subjunctive (*sit*), rather than a more conventional choice such as the gerundive (*transferenda sunt* in my first reference translation). More subtly, the tense of the verb in the second clause ("will not have been translated"), which should be rendered as the future perfect passive indicative, is instead given only as the perfect passive indicative. Finally, the adverb "well" is mysteriously replaced with the conjunction *atque*, meaning "and".

Google's rendering here is not only a bad interpretation of the original; it is unintelligible as a Latin sentence, both semantically and grammatically.

Neither is it uncommon for words to be dropped in translation, or have their meanings substituted for those of loosely related, but nonetheless different, words. Consider the following Latin antiphon:

Da pacem, Domine,  
in diebus nostris.  
Quia non est alius  
qui pugnet pro nobis  
nisi tu Deus noster.

Google translates this into English as: "Give peace in our time, O Lord / Because there is no other / Who will fight for us, / O Lord." Note that in the final line is translated as if *Nisi tu* and *noster* were omitted, and treats *Deus* as *Domine*; it should instead read "If not you, O our God," or something closely to the same effect.

Google Translate is the *de facto* commercial standard in translation technology, yet its results for English–Latin translations fall far behind other language pairs'. For example, consider this Spanish rendering of the same sentence given at the beginning of this section: *Hay que traducir estas palabras, pero no se habrán traducido bien*. Google translates this into English perfectly:

"These words have to be translated, but they will not have been translated well." The difference between English–Latin performance and English–Spanish performance is clear to see.

It is difficult to ascertain the precise root of the problem, as Google's interface is proprietary and not open-sourced. However, some well chosen inputs can offer some insight. There is a line in the Nicene Creed<sup>1</sup> which in English reads "and [I believe] in one holy, catholic, and apostolic Church." Google translates this as: *et in unum baptismum in remissionem peccatorum*.

Finally, we have flawless Latin! Except for one major problem: the Latin corresponds to the *next* line of the Creed, "and in one baptism unto the remission of sins," not the line given.

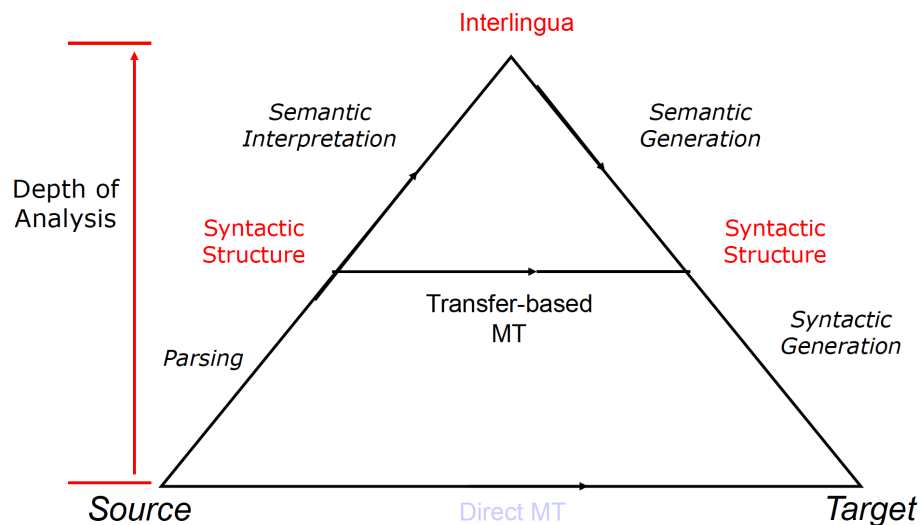
Similarly, we can compare the text of the first chapter of the Gospel of John across several versions: Jerome's Latin Vulgate, the standard Latin Bible in use since the 4th century (Appendix A); the Douay-Rheims-Challoner Version (1899 American Edition) (Appendix B) and Google Translate's rendering thereof; (Appendix C) and the Revised Standard Version (Catholic Edition) (Appendix D) and Google Translate's rendering thereof (Appendix E). All three Latin versions are virtually identical, despite the two English versions' substantial differences of style and diction.

These curious traits, taken together, suggest that Google has over-memorized some of the most common Latin texts, leading to carbon-copy translations when the same are entered, occasional near-misses where the output will be a flawless translation of the wrong part of a common input text, and a severe breakdown of grammar and vocabulary when unrelated text is entered.

The documentation for the Google Translate REST API<sup>2</sup> seems to support this hypothesis. It indicates that Google Translate utilizes two different translation models: Phrase-Based Machine Translation (PBMT) and Neural Machine Translation (NMT). Not every language is equipped with NMT, according to the documentation, but in general terms, both approaches rely primarily on learning. If grammar is incorporated at all, it plays second fiddle to the training data. In the case of Latin, which presumably has far less data available than modern languages, it shows.

### 3. Approach – *De modo appropinquationis*

#### 3.1. Overview



**Figure 1: The Triangle of Machine Translation.**

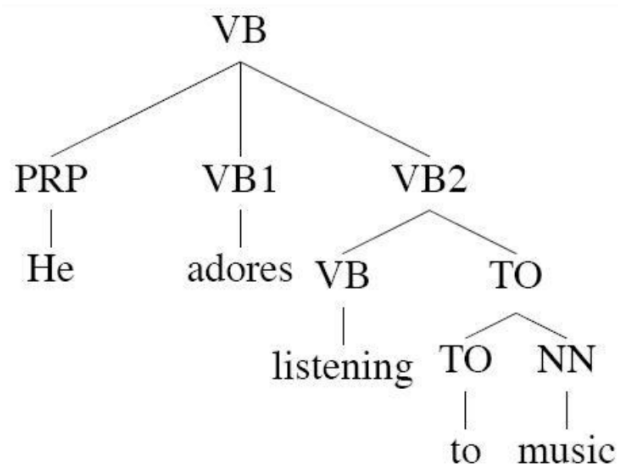
Approaches to machine translation can be visualized as a triangle, as shown in Figure 1.<sup>3</sup> On the lowest level of this triangle are "direct" approaches. These generally consist of word- or phrase-matching approaches with limited word reordering and some amount of morphological processing. Direct approaches can be "example-based", where the translator will "learn" certain phrases as it trains on parallel texts. E.g. if the translator sees during training that the phrase "I go to the market" consistently corresponds to "eo ad mercatum," it may store this phrasal translation and substitute it into translations. The main difficulty of such example-based direct approaches is to determine a suitable algorithm to find, store, and regenerate matches. Direct methods, including example-based methods, may utilize statistical methods such as n-gram Markov models or even deep learning. However, by definition they do not account for the syntactical or grammatical structure of the sentence, even if some of this information underlies certain patterns learned in example-based learning.

The middle level of the triangle represents "transfer-based" approaches. In such a setup, the translator will parse the grammar of the source text, map or transfer that information to the

target language's grammar (hence the name), and from there generate the target-language text. Transfer-based approaches have the advantage of retaining linguistic information that is ignored in direct approaches, which can help to produce better word ordering and morphological accuracy. Divergence between languages' structures, however, presents a challenge. For example, one word in the source language might be translated into several in the target language, e.g. *cecinissem* to "I might have sung".

The top level represents semantic approaches. The goal of such an approach is to represent the semantic meaning of the source text in an "interlingua" that, ideally, would be able to express every meaning possible across all human languages. If realized, this approach would be the gold standard of machine translation. However, a true interlingua does not yet exist.

### 3.2. Parsing



**Figure 2: A syntactic parse of an English sentence.**

Parses can be based either on syntactic structure or dependency relations. Syntactic parses are based on generation rules, such as  $S \rightarrow (NP, VP)$ , where the symbol  $S$  is a sentence,  $NP$  is a noun-phrase, and  $VP$  is a verb-phrase. In this rule, all symbols are "non-terminal", meaning they map to other rules. E.g.  $VP \rightarrow (V, NP)$ , where  $V$  is a verb. Unlike the other symbols shown,  $V$  is "terminal", meaning it maps directly to a word. These generation rules can be thought of as "unpacking" procedures (from the highest level of abstraction downwards) or as "bundling" procedures (from the

individual words to more abstract combinations). A syntactic parse of the English sentence "He adores listening to music" is shown in Figure 2.<sup>4</sup>

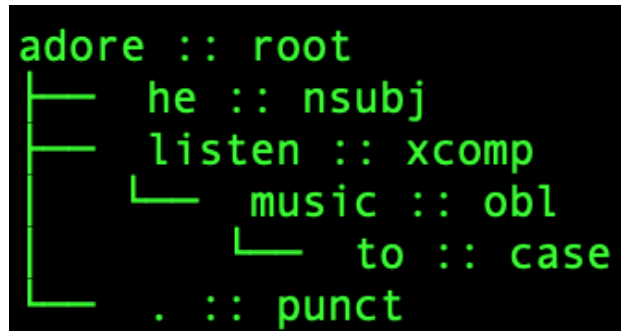


Figure 3: A dependency parse of an English sentence.

Dependency parses, as the name suggests, are based on the grammatical relationships between words, rather than their positions in the sentence. Using such a structure in place of a syntactic parse reduces problems owing to divergence between languages and makes morphological information more readily available. A dependency parse of the same English sentence is shown in Figure 3. *Interpreter* uses dependency parsing owing to these advantages, and particularly due to the divergences between Latin and English: the former is morphologically rich with flexible word order, whereas the latter is morphologically austere and comparatively rigid in its word order.

## 4. Implementation – *De rei constructione*

### 4.1. Constituent scripts

*Interpreter* is implemented as a collection of scripts in Python 2, with the exception of one that is written in Python 3. These scripts include:

- `clean.py`: a library to clean input text in preparation for processing.
- `parse_eng.py`: a script to produce dependency parses of English input text. Parses are stored as text files.
- `lemma_trans.py`: a library to translate English lemmas to their equivalents in Latin. The only Python 3 script.

- `transfer_eng2lat.py`: a script to produce new parse files with Latin lemmas substituted for the English originals.
- `compatibility.py`: a library to allow Python 2 code to call functions written in Python 3. Used exclusively by `transfer_eng2lat.py` to call `lemma_trans.translate_sentence()`.
- `words.py`, a library to represent and process target-language (Latin) words, especially their morphological features.
- `structure.py`, a library to reconstruct the dependency relations between words based on the input's sentence's parse, and to manipulate those relations.
- `generate.py`, a script to generate target-language (Latin) text from the lemma-replaced parses produced by `transfer_eng2lat.py`.

## 4.2. Dependencies

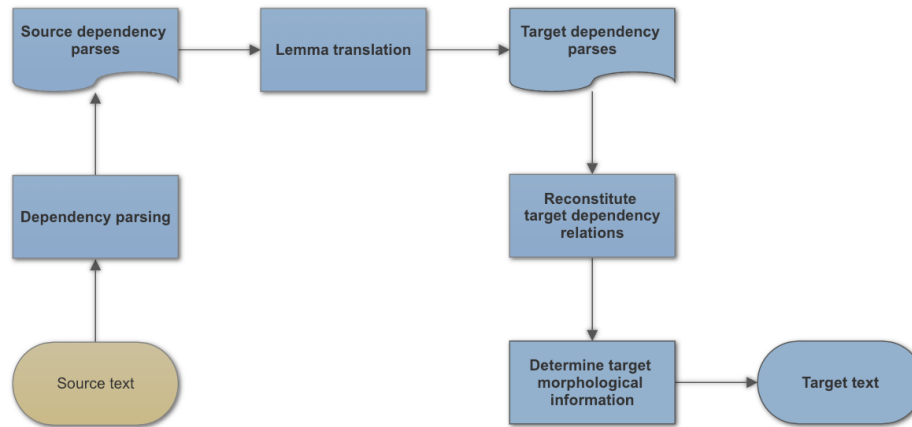
The application has several dependencies:

- Python
  - Python 2.7.13+
  - Python 3.6.4+
- UDPipe 1.2.0+: a library for parsing input text according trained models.
  - The Universal Dependencies 2.3 treebank model (for use in UDPipe) based on the English-language Georgetown University Multilayer (GUM) corpus.
- LatMor: a finite-state Latin morphological analyzer.
  - SFST (Stuttgart Finite State Transducer) 1.4.7d+
- multiwordnet 0.0.1.post9: a library for accessing and manipulating the MultiWordNet, a multilingual WordNet-like database.

## 4.3. Overview

At a high level, *Interpreter* works in four steps. First, the user provides input text, which is cleaned and parsed sentence by sentence. Second, the lemmas of each sentence are then translated one by one. Third, for each translated parse, the dependency structure of the sentence is reconstituted and





**Figure 4: Overview of the workflow of *Interpreter*.**

each word’s morphological information is determined. Finally, each sentence is generated and the resulting text is output. The flow of the process is shown in Figure 4.

#### 4.4. Parsing

The user first creates a `.txt` document containing the source-language (English) text to be translated. (This is purely a user task; *Interpreter* does not have any part in it.) This text is passed to `parse_eng.py` through standard input. It is cleaned using functions from `clean.py` and divided by sentence (determined by end-of-sentence punctuation). Each cleaned sentence is then written sequentially to a separate `.txt` file in a directory `text/`.

```

# newdoc
# newpar
# sent_id = 1
1   These   these   DET    DT      Number=Plur|PronType=Dem      2      det      -      -
2   words   word    NOUN   NNS     Number=Plur      5      nsubj:pass  -      -
3   must    must    AUX     MD      VerbForm=Fin     5      aux      -      -
4   be      be      AUX     VB      VerbForm=Inf     5      aux:pass  -      -
5   translated translate VERB    VBN     Tense=Past|VerbForm=Part      0      root      -      -
6   ,       ,       PUNCT   ,       -      13     punct    -      -
7   but     but     CCONJ   CC      -      13     cc      -      -
8   they    they    PRON    PRP     Case=Nom|Number=Plur|Person=3|PronType=Prs 13     nsubj:pass  -      -
9   will    will    AUX     MD      VerbForm=Fin     13     aux      -      -
10  not     not     PART    RB      Polarity=Neg     13     advmod    -      -
11  have    have    AUX     VB      VerbForm=Inf     13     aux      -      -
12  been    be      AUX     VBN     Tense=Past|VerbForm=Part      13     aux:pass  -      -
13  translated translate VERB    VBN     Tense=Past|VerbForm=Part      5      conj      -      -
14  well    well    ADV     RB      Degree=Pos       13     advmod    -      -
15  .       .       PUNCT   .       -      5      punct    -      -

```

**Figure 5: Contents of a source parse file `parses/source/parse0000.conllu`.**

Next, the UDPipe parsing pipeline is initialized with the GUM model and the contents of each text document are input therein to be parsed. The results of each parse are written to a separate file in CoNNL-U format (UDPipe’s variant of the Conference on Computational Natural Language

Processing’s format, CoNNL-X) in a directory `parses/source/`. A source parse in CoNNL-U format is shown in Figure 5.

#### 4.5. Lemma translation

1	hic	DET	DT	Number=Plur PronType=Dem	2	det	-	-		
2	verbum	NOUN	NNS	Number=Plur	5	nsubj:pass	-	-		
3	debeo	AUX	MD	VerbForm=Fin	5	aux	-	-		
4	sum	AUX	VB	VerbForm=Inf	5	aux:pass	-	-		
5	transfero	VERB	VRN	Tense=Past VerbForm=Part	0	root	-	-		
6	,	PUNCT	,	13	punct	-	-	-		
7	sed	CCONJ	CC	13	cc	-	-	-		
8	is	PRON	PRP	Case=Nom Number=Plur Person=3 PronType=Prs	13	nsubj:pass	-	-		
9	volo	AUX	MD	VerbForm=Fin	13	aux	-	-		
10	non	PART	RB	Polarity=Neg	13	advmod	-	-		
11	habeo	AUX	VB	VerbForm=Inf	13	aux	-	-		
12	sum	AUX	VRN	Tense=Past VerbForm=Part	13	aux:pass	-	-		
13	transfero	VERB	VRN	Tense=Past VerbForm=Part	5	conj	-	-		
14	recte	ADV	RB	Degree=Pos	13	advmod	-	-		
15	.	PUNCT	.	5	punct	-	-	-		

Figure 6: Contents of a source parse file `parses/target/parse0000.conllu`.

Next *Interpreter* runs `transfer_eng2lat.py` to produce translated parses. For each source parse file in `parses/source/`, the script reads the file to collect the source lemmas; translates the source lemmas using functions from `lemma_trans.py`; and then writes a corresponding target parse file, also in CoNNL-U format, to `parses/target/`. Each target parse file retains all the same morphological and dependency information contained in the source parse file, but omits each inflected wordform and replaces the source lemma with its translation. It also omits unnecessary header information. A target parse in CoNNL-U format is shown in Figure 6.

At each call to `lemma_trans.py` (by way of `compatibility.py`), *Interpreter* accesses the MultiWordNet to produce a translation of the source lemmas. To do this, it compiles English and Latin WordNet databases if this has not already been done and initializes the WordNets, then proceeds to translate each word in sequence. For each word, if the word is a manually set stopword, it returns the predetermined translation. If the word is not a stopword, it proceeds to try to find the lemma in the source WordNet. If the lemma is not found in the WordNet, a default value (the source lemma preceded by an asterisk) is returned; otherwise the script proceeds.

*Aside:* In a WordNet, each lemma is associated with a list of sets of synonyms, each of which is known as a *synset*. So we say that each lemma is associated with a list of synsets. In the MultiWordNet, these synsets are linked across languages by semantic meaning with universal

identifiers (IDs). This means that, given a synset, a user can store its ID and use that to access the same synset from another language’s WordNet. *End of digression.*

If the script did not default at the previous step, it stores the lemma’s list of synsets and attempts to determine the best synset from which to pick a translation. To do this, it assigns each synset ID a score  $X_i$ , computed as follows:

$$X_i = \max |s| - |s_i| - p - |t_i|,$$

where  $s_i$  is the  $i$ th synset in the lemma’s list of synsets in the source language,  $t_i$  is the  $i$ th synset in the lemma’s list of synsets in the target language,  $|x|$  denotes the cardinality of a synset in a given language, and  $p$  is the position (or index) of the source lemma in  $s_i$ . Then the target-language synset with the highest score is chosen.

From the chosen target synset, the script picks the target lemma with the highest Levenshtein similarity (normalized edit distance) to the source lemma. This favors cognates and words of similar lengths.

If at any point in this process an error is raised, or if a chosen a synset or lemma is empty in the target language, the same asterisk-prefixed default value is returned.

**4.5.1. Issues with incorporation** An earlier attempt at a lexicon, using the dictionary files from the semifamous Whitaker’s Words application out of Notre Dame University, failed late in implementation. Finding and incorporating the MultiWordNet was a time-consuming process that all other halted work on the project for several weeks. Several ancillary goals, such as bidirectionality and performance improvement, had to be put aside as a result.

## 4.6. Dependency structure reconstitution

For each target parse file in `parses/target/`, *Interpreter* next reconstructs the dependency relations between the words of the sentence, representing each word as a node of a tree. Each word on the tree is represented as an Word object from `words.py`. If the part of speech of the word is

known, as is almost always the case except for punctuation and a small handful of irregular cases, the word is represented by one of the following subclasses of Word:

- Noun, representing common nouns proper nouns, and some pronouns;
- Adj, representing adjectives, determiners, and other pronouns;
- Adv, representing adverbs;
- Verb, representing finite verbs, auxiliary verbs, infinitives, participles, and gerundives; and
- Indekl, representing miscellaneous indeclinable words, including but not limited to prepositions, conjunctions, numbers, particles, and interjections; also used to find default forms in case of errors during generation.

```
transfere :: root :: be
├─ verbum :: nsubj:pass :: word
│   └─ hic :: det :: these
├─ debeo :: aux :: must
├─ esse :: aux:pass :: translate
├─ transfere :: conj :: be
│   └─ , :: punct :: ,
│       └─ sed :: cc :: but
│           └─ is :: nsubj:pass :: they
│               └─ volo :: aux :: will
│                   └─ non :: advmod :: not
│                       └─ habeo :: aux :: translate
│                           └─ esse :: aux:pass :: be
│                               └─ recte :: advmod :: well
└─ . :: punct :: .
```

**Figure 7: The reconstructed dependency relations of a parsed sentence with lemmas translated.**

A visual representation of this reconstruction is shown in Figure 7.

Each Word object contains several methods to determine the word's morphological features, using its own morphological taken the parse, as well as its relationships to other words. E.g. each word can access its parent, siblings, and children, as well as the words that linearly precede and follow it in the sentence. These words can also decide that they, or one of their peers, need to be "ignored" during generation. This occurs in cases of auxiliary verbs that are incorporated into the conjugation of the main verb (e.g. "have" in perfect tense constructions); nominative non-possessive personal pronouns (e.g. "I", "he"); and marker words that determine the case of a noun, pronoun,

or adjective but do not belong in the translation (e.g. "for" as a dative marker, "of" as a genitive marker").

#### 4.7. Generation and output

```
hic<PRO><dem><neut><pl><nom>
verbum<N><neut><pl><nom>
debere<V><pres><ind><active><pl><3>
transferre<gerundivum><positive><neut><pl><nom>
esse<V><pres><ind><active><pl><3>
PUNCT_,
sed<CONJ>
is<PRO><dem><masc><pl><nom>
velle<V><pres><ind><active><pl><3>
non<PART>
transferre<V><part><perf><passive><masc><pl><nom>
esse<V><part><perf><passive><masc><pl><nom>
esse<V><futureI><ind><active><pl><3>
recte<ADV><positive>
PUNCT_.
```

Figure 8: The generation code file `latmor_files/latmor0000.txt` for a sentence about to be generated.

For each sentence, a file is created in the directory `latmor_files` that will contain that sentence's generation codes. By "generation code", I mean the input to the LatMor morphological analyzer that will produce the properly inflected form of the lemma. This code is a property of each Word object in the sentence that is determined along with the word's morphological features. The generation code for each node in a sentence's dependency tree, traversing the sentence linearly, is written to the file. An example of such a file is shown in Figurefig:latmor-file.

For each sentence, the generation codes are batch-processed by LatMor and the generated forms are stored. Among those forms not corresponding to an "ignored" word, if generation resulted in an error, *Interpretor* takes steps to find a "default" form of the word given the morphological information available for the word. If this succeeds, the default form is used for that word. Otherwise, the generation code with an asterisk appended to the front is stored in place of a generated form, to allow the reader to ascertain what may have been meant.

With these replacements made for each sentence, all non-ignored generated forms are written

to a file in `gen/`. Once all the generation files are written, they are concatenated together in order into a final output file in the working directory whose name is specified by the user, and the file is automatically opened in the system's default text editor. The contents of standard error are also written to a file `gen_errors.txt` in the working directory.

Upon rerunning *Interpreter*, the directories `text`, `parses`, `latmor_files`, and `gen`, as well as `gen_errors.txt`, are deleted and remade.

#### 4.8. Parallelization

The lemma translation performed by `transfer_eng2lat.py` and the generation performed by `generate.py` are both "stupidly parallel" processes. *Interpreter* exploits this fact, running them in parallel on up to 8 processors using Python's `multiprocessing` module. Users may edit the source code to modify this specification to meet their needs.

### 5. Evaluation and Future Work – *De probatione et operibus facendis*

The following is the translation that *Interpreter* gives of the first several lines of the Gospel according to John, using the Revised Standard Version (Catholic Edition) for the source text. (*Interpreter's* translation of the first chapter may be found in Appendix F.) This translation's performance data is shown in Table 1.

in initiō erat verbum , et verbō erat cum Deō , et verbum \*Deus<V><imperf><ind><passive><sg><3>

.

erat in initiō cum Deō ; omnēs rēs faciēbantur per eum , et sine erat nōn alius factus  
faciēbātur .

in erat vīta , et vītae erat lūcis hominum .

lūcidōrum fulgōrum in obscuritāte , et obscuritās habent nōn convinceris id .

erat homō dēstinātus ex Deō , cuius cognōmen erat Iōannē .

veniēbat \*testimony<N><masc><sg><dat> , gereris servātōrem ad lūcem , ut omnia  
arbitrārētur per eum .

Step	Real	User	Sys
Parsing	0m2.225s	0m2.015s	0m0.137s
Lemma translation	0m27.206s	0m0.497s	0m0.472s
Reconstruction/Generation	3m32.801s	20m22.297s	1m36.286s
<b>Total</b>	4m2.465s	20m24.845s	1m36.939s

**Table 1: Performance data for John 1 RSVCE translation.**

The Bilingual Evaluation Understudy (BLEU) score is generally considered the standard automated metric for machine translation. It ranges from 0 to 1. The BLEU score for this translation, however, measured against Jerome’s Vulgate, is absurdly and artificially low, at 0.0106.

BLEU scores expect to find exact matches between source and target. With a language as morphologically rich and, at times, flexible as Latin, that is a very demanding standard, which would likely greatly deflate even human translators’ scores. The problem is exacerbated by *Interpreter*’s synset-based lexical approach.

However, the more important reason for the low score seems to be *Interpreter*’s deficiencies, which make machine scoring near useless. We will now turn our attention to these issues.

## 5.1. Factors affecting translation

**5.1.1. Limited lexicon** The Latin WordNet in the MultiWordNet has very few lemmas compared to the English WordNet. The two databases contain approximately 40,000<sup>5</sup> and 152,000<sup>6</sup> lemmas, respectively. A Latin WordNet 2.0 database for the `multiwordnet` module is in progress to release in the near future, which will greatly expand *Interpreter*’s potential vocabulary.

Additionally, WordNets in general do not include stopwords such as prepositions and pronouns; those have to be added manually, as described in a previous section. It is exceedingly likely that there are still lemmas missing from this stoplist.

**5.1.2. Lemma translation selection** The scoring system to choose the best target synset and the best lemma among that best synset are an admittedly contrived attempt to find the "most ordinary" meaning of a word. This method ought to be revised to better exploit the rich hyponymy and hypernymy relations that the MultiWordNet contains.

**5.1.3. Parsing accuracy** In the first line of the translation alone, we see that the parser is far from infallible. Here it has interpreted "God" as a verb. There is little to be done about this issue besides to find or wait for a better parser to be developed.

**5.1.4. Compatibility of components** There is also the issue of general compatibility between components. LatMor, for instance, can work with 70,000 lemmas.<sup>7</sup> There is no guarantee that these 70,000 are a perfect superset of the 40,000 in the Latin WordNet; nor would this cover a Latin WordNet 2.0 expanded to be on par with its English counterpart.

**5.1.5. Determining morphological information** The process of gathering morphological information for the target-language words is still crude. Future versions will need to refine this process to be more accurate and comprehensive.

## **5.2. Other issues**

**5.2.1. Performance** Despite the multithreading, performance is still slower than ideal for large inputs. Future versions should investigate the use of PyPy rather than CPython as the interpreter. PyPy is a just-in-time compiler that is known for performance improvements, and it may be useful here.

**5.2.2. Language modelling** To promote natural word ordering, future versions should incorporate a language model trained on a corpus of target-language text to determine the most likely arrangements of words within n-grams, or among the children of a node in the dependency parse tree.

**5.2.3. Bidirectionality** It would be ideal for this translator to work in the Latin-to-English direction as well. Such was the intention of this paper; however, time constraints, mostly issues that arose with incorporating the lexicon as previously noted, prevented this.

## **5.3. Human evaluation**

Ideal evaluation would be done by a professional Latinist, such as a professor of classics or a properly educated Catholic cleric. Even better would be to have several evaluators. This has not been possible due to the aforementioned time constraints.



## 6. Conclusion – *De conclusionibus*

In light of constraints on components and their intercompatibility, and especially of the failed first attempt at a lexicon, *Interpreter* is a success, albeit still need of future refinement. In general it achieves greater grammatical clarity than Google Translate, as was its goal, and it does so without cheating by memorizing the entire text beforehand. The interface is userfriendly, requiring a single terminal command with only two arguments and presenting output in an intuitive, portable way. This author believes *Interpreter* to be a significant step forward for classical language machine translation with great potential for expansion and refinement.

## 7. Acknowledgements – *De gratiis datandis*

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## Notes

<sup>1</sup>A Christian doctrinal and liturgical text originating from the First Council of Nicaea in A.D. 325; also called the Niceno-Constantinopolitan Creed, the *Symbolum Nicaenum*, the Credo, or simply the Creed; <http://www.newadvent.org/cathen/11049a.htm>

<sup>2</sup>Cloud Translation API – Method: translate, <https://cloud.google.com/translate/docs/reference/translate>

<sup>3</sup>Credit to Prof. Srinivas Bangalore. From slides for COS 401: Introduction to Machine Translation, Spring 2018.

<sup>4</sup>Credit to Prof. Srinivas Bangalore. From slides for COS 401: Introduction to Machine Translation, Spring 2018.

<sup>5</sup><https://pypi.org/project/multiwordnet/>

<sup>6</sup><https://wordnet.princeton.edu/documentation/20-wnstats7wn>

<sup>7</sup><https://www.degruyter.com/downloadpdf/j/opli.2016.2.issue-1/opli-2016-0019/opli-2016-0019.pdf>

## Appendix A: Jerome's Latin Vulgate

*Initium Sancti Evangelii secundum Joannem.*<sup>8</sup>

1 [In principio erat Verbum, et Verbum erat apud Deum, et Deus erat Verbum. 2 Hoc erat in principio apud Deum. 3 Omnia per ipsum facta sunt: et sine ipso factum est nihil, quod factum est. 4 In ipso vita erat, et vita erat lux hominum: 5 et lux in tenebris lucet, et tenebræ eam non comprehenderunt. 6 Fuit homo missus a Deo, cui nomen erat Joannes. 7 Hic venit in testimonium ut testimonium perhiberet de lumine, ut omnes crederent per illum. 8 Non erat ille lux, sed ut testimonium perhiberet de lumine. 9 Erat lux vera, quæ illuminat omnem hominem venientem in hunc mundum. 10 In mundo erat, et mundus per ipsum factus est, et mundus eum non cognovit. 11 In propria venit, et sui eum non receperunt. 12 Quotquot autem receperunt eum, dedit eis potestatem filios Dei fieri, his qui credunt in nomine ejus: 13 qui non ex sanguinibus, neque ex voluntate carnis, neque ex voluntate viri, sed ex Deo nati sunt. 14 Et Verbum caro factum est, et habitavit in nobis: et vidimus gloriam ejus, gloriam quasi unigeniti a Patre plenum gratiæ et veritatis. 15 Joannes testimonium perhibet de ipso, et clamat dicens: Hic erat quem dixi: Qui post me venturus est, ante me factus est: quia prior me erat. 16 Et de plenitudine ejus nos omnes accepimus, et gratiam pro gratia: 17 quia lex per Moysen data est, gratia et veritas per Jesum Christum facta est. 18 Deum nemo vidit umquam: unigenitus Filius, qui est in sinu Patris, ipse enarravit.] 19 Et hoc est testimonium Joannis, quando miserunt Judæi ab Jerosolymis sacerdotes et Levitas ad eum ut interrogarent eum: Tu quis es? 20 Et confessus est, et non negavit, et confessus est: Quia non sum ego Christus. 21 Et interrogaverunt eum: Quid ergo? Elias es tu? Et dixit: Non sum. Propheta es tu? Et respondit: Non. 22 Dixerunt ergo ei: Quis es ut responsum demus his qui miserunt nos? quid dicis de teipso? 23 Ait: Ego vox clamantis in deserto: Dirigite viam Domini, sicut dixit Isaias propheta. 24 Et qui missi fuerant, erant ex pharisæis. 25 Et interrogaverunt eum, et dixerunt ei: Quid ergo baptizas, si tu non es Christus, neque Elias, neque propheta? 26 Respondit eis Joannes, dicens: Ego baptizo in aqua: medius autem vestrum stetit, quem vos nescitis. 27 Ipse est qui post me venturus est, qui ante me factus est: cujus ego non sum dignus ut solvam ejus corrigiam calceamenti.

28 Hæc in Bethania facta sunt trans Jordanem, ubi erat Joannes baptizans. 29 Altera die vidit Joannes Jesum venientem ad se, et ait: Ecce agnus Dei, ecce qui tollit peccatum mundi. 30 Hic est de quo dixi: Post me venit vir qui ante me factus est: quia prior me erat: 31 et ego nesciebam eum, sed ut manifestetur in Israël, propterea veni ego in aqua baptizans. 32 Et testimonium perhibuit Joannes, dicens: Quia vidi Spiritum descendentem quasi columbam de cælo, et mansit super eum. 33 Et ego nesciebam eum: sed qui misit me baptizare in aqua, ille mihi dixit: Super quem videris Spiritum descendentem, et manentem super eum, hic est qui baptizat in Spiritu Sancto. 34 Et ego vidi: et testimonium perhibui quia hic est Filius Dei. 35 Altera die iterum stabat Joannes, et ex discipulis ejus duo. 36 Et respiciens Jesum ambulantes, dicit: Ecce agnus Dei. 37 Et audierunt eum duo discipuli loquentem, et secuti sunt Jesum. 38 Conversus autem Jesus, et videns eos sequentes se, dicit eis: Quid quæritis? Qui dixerunt ei: Rabbi (quod dicitur interpretatum Magister), ubi habitas? 39 Dicit eis: Venite et videte. Venerunt, et viderunt ubi maneret, et apud eum manserunt die illo: hora autem erat quasi decima. 40 Erat autem Andreas, frater Simonis Petri, unus ex duobus qui audierant a Joanne, et secuti fuerant eum. 41 Invenit hic primum fratrem suum Simonem, et dicit ei: Invenimus Messiam (quod est interpretatum Christus). 42 Et adduxit eum ad Jesum. Intuitus autem eum Jesus, dicit: Tu es Simon, filius Jona; tu vocaberis Cephas, quod interpretatur Petrus. 43 In crastinam voluit exire in Galilæam, et invenit Philippum. Et dicit ei Jesus: Sequere me. 44 Erat autem Philippus a Bethsaida, civitate Andreæ et Petri. 45 Invenit Philippus Nathanaël, et dicit ei: Quem scripsit Moyses in lege, et prophetæ, invenimus Jesum filium Joseph a Nazareth. 46 Et dixit ei Nathanaël: A Nazareth potest aliquid boni esse? Dicit ei Philippus: Veni et vide. 47 Vidit Jesus Nathanaël venientem ad se, et dicit de eo: Ecce vere Israëlita, in quo dolus non est. 48 Dicit ei Nathanaël: Unde me nosti? Respondit Jesus, et dixit ei: Priusquam te Philippus vocavit, cum esses sub ficu, vidi te. 49 Respondit ei Nathanaël, et ait: Rabbi, tu es Filius Dei, tu es rex Israël. 50 Respondit Jesus, et dixit ei: Quia dixi tibi: Vidi te sub ficu, credis; majus his videbis. 51 Et dicit ei: Amen, amen dico vobis, videbitis cælum apertum, et angelos Dei ascendentes, et descendentes supra Filium hominis.

*Laus tibi Domine Jesu Christe.*

## **Appendix B: Douay-Rheims-Challoner Version (1899 American Ed.)**

*The beginning of the Holy Gospel according to John.*<sup>9</sup>

1 In the beginning was the Word, and the Word was with God, and the Word was God. 2 The same was in the beginning with God. 3 All things were made by him: and without him was made nothing that was made. 4 In him was life, and the life was the light of men. 5 And the light shineth in darkness, and the darkness did not comprehend it. 6 There was a man sent from God, whose name was John. 7 This man came for a witness, to give testimony of the light, that all men might believe through him. 8 He was not the light, but was to give testimony of the light. 9 That was the true light, which enlighteneth every man that cometh into this world. 10 He was in the world, and the world was made by him, and the world knew him not. 11 He came unto his own, and his own received him not. 12 But as many as received him, he gave them power to be made the sons of God, to them that believe in his name. 13 Who are born, not of blood, nor of the will of the flesh, nor of the will of man, but of God. 14 And the Word was made flesh, and dwelt among us, (and we saw his glory, the glory as it were of the only begotten of the Father,) full of grace and truth. 15 John beareth witness of him, and crieth out, saying: This was he of whom I spoke: He that shall come after me, is preferred before me: because he was before me. 16 And of his fulness we all have received, and grace for grace. 17 For the law was given by Moses; grace and truth came by Jesus Christ. 18 No man hath seen God at any time: the only begotten Son who is in the bosom of the Father, he hath declared him. 19 And this is the testimony of John, when the Jews sent from Jerusalem priests and Levites to him, to ask him: Who art thou? 20 And he confessed, and did not deny: and he confessed: I am not the Christ. 21 And they asked him: What then? Art thou Elias? And he said: I am not. Art thou the prophet? And he answered: No. 22 They said therefore unto him: Who art thou, that we may give an answer to them that sent us? What sayest thou of thyself? 23 He said: I am the voice of one crying out in the wilderness, make straight the way of the Lord, as said the prophet Isaias. 24 And they that were sent, were of the Pharisees. 25 And they asked him, and said to him: Why then dost thou baptize, if thou be not Christ, nor Elias, nor the prophet?

26 John answered them, saying: I baptize with water; but there hath stood one in the midst of you, whom you know not. 27 The same is he that shall come after me, who is preferred before me: the latchet of whose shoe I am not worthy to loose. 28 These things were done in Bethania, beyond the Jordan, where John was baptizing. 29 The next day, John saw Jesus coming to him, and he saith: Behold the Lamb of God, behold him who taketh away the sin of the world. 30 This is he, of whom I said: After me there cometh a man, who is preferred before me: because he was before me. 31 And I knew him not, but that he may be made manifest in Israel, therefore am I come baptizing with water. 32 And John gave testimony, saying: I saw the Spirit coming down, as a dove from heaven, and he remained upon him. 33 And I knew him not; but he who sent me to baptize with water, said to me: He upon whom thou shalt see the Spirit descending, and remaining upon him, he it is that baptizeth with the Holy Ghost. 34 And I saw, and I gave testimony, that this is the Son of God. 35 The next day again John stood, and two of his disciples. 36 And beholding Jesus walking, he saith: Behold the Lamb of God. 37 And the two disciples heard him speak, and they followed Jesus. 38 And Jesus turning, and seeing them following him, saith to them: What seek you? Who said to him, Rabbi, (which is to say, being interpreted, Master,) where dwellest thou? 39 He saith to them: Come and see. They came, and saw where he abode, and they stayed with him that day: now it was about the tenth hour. 40 And Andrew, the brother of Simon Peter, was one of the two who had heard of John, and followed him. 41 He findeth first his brother Simon, and saith to him: We have found the Messiah, which is, being interpreted, the Christ. 42 And he brought him to Jesus. And Jesus looking upon him, said: Thou art Simon the son of Jona: thou shalt be called Cephas, which is interpreted Peter. 43 On the following day, he would go forth into Galilee, and he findeth Philip. And Jesus saith to him: Follow me. 44 Now Philip was of Bethsaida, the city of Andrew and Peter. 45 Philip findeth Nathanael, and saith to him: We have found him of whom Moses in the law, and the prophets did write, Jesus the son of Joseph of Nazareth. 46 And Nathanael said to him: Can any thing of good come from Nazareth? Philip saith to him: Come and see. 47 Jesus saw Nathanael coming to him: and he saith of him: Behold an Israelite indeed, in whom there is no guile. 48 Nathanael saith to him: Whence knowest thou me? Jesus answered, and said to him: Before that

Philip called thee, when thou wast under the fig tree, I saw thee. 49 Nathanael answered him, and said: Rabbi, thou art the Son of God, thou art the King of Israel. 50 Jesus answered, and said to him: Because I said unto thee, I saw thee under the fig tree, thou believest: greater things than these shalt thou see. 51 And he saith to him: Amen, amen I say to you, you shall see the heaven opened, and the angels of God ascending and descending upon the Son of man.

*Praise to Thee, Lord Jesus Christ.*

## **Appendix C: Douay-Rheims-Challoner Version (1899 American Ed.) with Google Translate**

*Initium Sancti Evangelii secundum Joannem.*<sup>10</sup>

I In principio erat Verbum, et Verbum erat apud Deum, et Deus erat Verbum. II: hoc erat in principio apud Deum. III Omnia per ipsum facta sunt: et sine ipso factum est nihil, quod factum est. IV In ipso vita erat, et vita erat lux hominum. V Et lux in tenebris lucet, et tenebrae eam non comprehenderunt. VI fuit homo missus a Deo, cui nomen erat Ioannes. VII Hic venit in testimonium, ut testimonium perhiberet de lumine, ut omnes crederent per illum. VIII Non erat ille lux, sed ut testimonium perhiberet de lumine. IX Quod erat lux vera quae inluminat omnem hominem venientem in hunc mundum. X In mundo erat, et mundus per ipsum factus est, et mundus eum non cognovit. XI qui in sua propria venit, et sui eum non receperunt. XII Quotquot autem receperunt eum, dedit eis potestatem filios Dei fieri, his qui credunt in nomine ejus. XIII Qui nati sunt qui non ex sanguinibus, neque ex voluntate carnis, neque ex voluntate viri, sed ex Deo. XIV Et Verbum caro factum est, et habitavit in nobis, (et vidimus gloriam ejus, gloriam quasi Unigeniti a Patre,) plenum gratia et veritate. XV Ioannes testimonium perhibet de ipso, et clamat dicens: Hic erat quem dixi: Qui post me venturus est, ante me factus est: quia prior me erat. XVI Et de plenitudine ejus nos omnes accepimus, et gratiam pro gratia. XVII quia lex per Moysen data est; factum est gratia et veritas per Jesum Christum. XVIII Deum nemo vidit umquam: unigenitus Filius qui est in sinu Patris, ipse enarravit. XIX Et hoc est testimonium Ioannis, quando miserunt ad eum Iudaei ab Hierosolymis sacerdotes et Levitas ad eum ut interrogarent eum: Tu quis es? XX Et confessus est, et non negavit, et confessus est: Quia non sum ego Christus. XXI Et interrogaverunt eum: Quid ergo? Ergo Helias es tu Et dixit: Non sum. Propheta es tu? Et ille respondit: No. XXII Dixerunt ergo ei: Quis es ut responsum demus his qui miserunt nos? Quid dicis de teipso? XXIII Qui dixit: Ego sum vox clamantis in deserto: Dirigite viam Domini, sicut dixit Isaias propheta. XXIV Et qui missi fuerant, erant ex pharisæis. XXV Et interrogaverunt eum, et dixerunt ei: Quid ergo baptizas, si tu non es Christus, neque Elias, neque propheta? XXVI respondit eis Iohannes



dicens ego baptizo in aqua: quis autem vestrum stetit in medio vestrum stetit, quem vos nescitis. XXVII Quod eadem est qui post me venturus est, qui ante me factus est: cuius ego non sum dignus ut solvam ejus corrigiam calceamenti. XXVIII omnia haec in Bethania facta sunt trans Iordanem, ubi erat Ioannes baptizans. XXIX Et altera die videt Iohannes Iesum venientem ad se, et ait: Ecce agnus Dei, ecce qui tollit peccatum mundi. XXX Hic est, de quo dixi: Post me venit vir, qui ante me factus est: quia prior me erat. XXXI Et ego nesciebam eum, sed ut manifestetur in Israel, propterea veni ego in aqua baptizans. XXXII Et testimonium perhibuit Ioannes, dicens: Quia vidi Spiritum descendantem quasi columbam de caelo, et mansit super eum. XXXIII Et ego nesciebam eum: sed qui me misit baptizare in aqua, ille mihi dixit: Super quem videris Spiritum descendantem et manentem super eum hic est qui baptizat in Spiritu sancto. XXXIV Et ego vidi: et testimonium perhibui quia hic est Filius Dei. XXXV Et altera die iterum stabat Ioannes, et ex discipulis ejus duo. XXXVI Et respiciens Iesum ambulantem, dicit: Ecce agnus Dei. XXXVII Et audierunt eum duo discipuli loquentem, et secuti sunt Iesum. XXXVIII Conversus autem Iesus, et videns eos sequentes se, dicit eis: Quid quaeritis? Qui dixerunt ei: Rabbi (quod dicitur interpretatum Magister), ubi habitas? XXXIX convocatis discipulis, ait illis: Veni, et vide. Venerunt, et viderunt ubi maneret et apud eum manserunt die illo hora autem erat quasi decima. XL Erat autem Andreas, frater Simonis Petri, unus ex duobus, qui audierant a Ioanne, et secuti fuerant eum. XLI Invenit hic primum fratrem suum Simonem et dicit ei invenimus Messiam quod est interpretatum Christus est. XLII Et duxit eum ad Iesum. Iesus autem intuitus autem eum Iesus dixit tu es Simon filius Iohanna tu vocaberis Cephas, quod interpretatur Petrus. XLIII In crastinam voluit exire in Galilaeam, et invenit Philippum. Iesus autem ait illi sequere me. XLIV autem Philippus a Bethsaida, civitate Andreæ et Petri. XLV Invenit Philippus Nathanael, et dicit ei: Invenimus ei quem scripsit Moses in lege et prophetae invenimus Iesum filium Joseph a Nazareth. XLVI Et dixit ei Nathanael: A Nazareth potest aliquid boni? Dicit ei Philippus: Veni et vide. XLVII vidit Iesus Nathanael venientem ad se et dicit de eo: Ecce vere Israëlita, in quo dolus non est. XLVIII Dicit ei Nathanael: Unde me nosti? Respondit Iesus et dixit ei priusquam te Philippus vocaret cum esses sub ficu, vidi te. XLIX Respondit ei Nathanael, et ait: Rabbi, tu es Filius Dei, tu es Rex Israel. L respondit Iesus, et dixit ei: Quia dixi

tibi: Vidi te sub ficu, credis: maius his videbis. LI Et dicit ei: Amen, Amen dico vobis, videbitis  
cælum apertum, et angelos Dei ascendentes, et descendentes supra Filium hominis.

*Laus tibi Domine Jesu Christe.*

## 8. Appendix D: Revised Standard Version (Catholic Ed.)

*The beginning of the Holy Gospel according to John.*<sup>11</sup>

### The Word Became Flesh

1 In the beginning was the Word, and the Word was with God, and the Word was God.[a] 2 He was in the beginning with God; 3 all things were made through him, and without him was not anything made that was made. 4 In him was life,[b] and the life was the light of men. 5 The light shines in the darkness,[c] and the darkness has not overcome it.

6 There was a man sent from God, whose name was John. 7 He came for testimony, to bear witness to the light, that all might believe through him. 8 He was not the light, but came to bear witness to the light.

9 The true light that enlightens every man was coming into the world. 10 He was in the world, and the world was made through him, yet the world knew him not. 11 He came to his own home, and his own people received him not. 12 But to all who received him, who believed in his name, he gave power to become children of God; 13 who were born, not of blood nor of the will of the flesh nor of the will of man, but of God.

14 And the Word became flesh and dwelt among us, full of grace and truth; we have beheld his glory, glory as of the only Son from the Father. 15 (John bore witness to him, and cried, "This was he of whom I said, 'He who comes after me ranks before me, for he was before me.'") 16 And from his fulness have we all received, grace upon grace. 17 For the law was given through Moses; grace and truth came through Jesus Christ. 18 No one has ever seen God; the only Son,[d] who is in the bosom of the Father, he has made him known.

### The Testimony of John the Baptist

19 And this is the testimony of John, when the Jews sent priests and Levites from Jerusalem to ask him, "Who are you?" 20 He confessed, he did not deny, but confessed, "I am not the Christ." 21 And they asked him, "What then? Are you Eli'jah?" He said, "I am not." "Are you the prophet?" And he answered, "No." 22 They said to him then, "Who are you? Let us have an answer for those

who sent us. What do you say about yourself?” 23 He said, “I am the voice of one crying in the wilderness, ‘Make straight the way of the Lord,’ as the prophet Isaiah said.”

24 Now they had been sent from the Pharisees. 25 They asked him, “Then why are you baptizing, if you are neither the Christ, nor Eli’jah, nor the prophet?” 26 John answered them, “I baptize with water; but among you stands one whom you do not know, 27 even he who comes after me, the thong of whose sandal I am not worthy to untie.” 28 This took place in Bethany beyond the Jordan, where John was baptizing.

#### The Lamb of God

29 The next day he saw Jesus coming toward him, and said, “Behold, the Lamb of God, who takes away the sin of the world![e] 30 This is he of whom I said, ‘After me comes a man who ranks before me, for he was before me.’ 31 I myself did not know him; but for this I came baptizing with water, that he might be revealed to Israel.” 32 And John bore witness, “I saw the Spirit descend as a dove from heaven, and it remained on him. 33 I myself did not know him; but he who sent me to baptize with water said to me, ‘He on whom you see the Spirit descend and remain, this is he who baptizes with the Holy Spirit.’ 34 And I have seen and have borne witness that this is the Son of God.”

#### The First Disciples of Jesus

35 The next day again John was standing with two of his disciples; 36 and he looked at Jesus as he walked, and said, “Behold, the Lamb of God!” 37 The two disciples heard him say this, and they followed Jesus. 38 Jesus turned, and saw them following, and said to them, “What do you seek?” And they said to him, “Rabbi” (which means Teacher), “where are you staying?” 39 He said to them, “Come and see.” They came and saw where he was staying; and they stayed with him that day, for it was about the tenth hour. 40 One of the two who heard John speak, and followed him, was Andrew, Simon Peter’s brother. 41 He first found his brother Simon, and said to him, “We have found the Messiah” (which means Christ). 42 He brought him to Jesus. Jesus looked at him, and said, “So you are Simon the son of John? You shall be called Cephas” (which means Peter[f]).

#### Jesus Calls Philip and Nathanael

43 The next day Jesus decided to go to Galilee. And he found Philip and said to him, "Follow me."  
44 Now Philip was from Beth-sa'ida, the city of Andrew and Peter. 45 Philip found Nathan'a-el, and said to him, "We have found him of whom Moses in the law and also the prophets wrote, Jesus of Nazareth, the son of Joseph." 46 Nathan'a-el said to him, "Can anything good come out of Nazareth?" Philip said to him, "Come and see." 47 Jesus saw Nathan'a-el coming to him, and said of him, "Behold, an Israelite indeed, in whom is no guile!" 48 Nathan'a-el said to him, "How do you know me?" Jesus answered him, "Before Philip called you, when you were under the fig tree, I saw you." 49 Nathan'a-el answered him, "Rabbi, you are the Son of God! You are the King of Israel!" 50 Jesus answered him, "Because I said to you, I saw you under the fig tree, do you believe? You shall see greater things than these." 51 And he said to him, "Truly, truly, I say to you, you will see heaven opened, and the angels of God ascending and descending upon the Son of man."

*Praise to Thee, Lord Jesus Christ.*

## Appendix E: Revised Standard Version (Catholic Ed.) with Google Translate

*Initium Sancti Evangelii secundum Joannem.*<sup>12</sup>

Verbum Caro Factum

I In principio erat Verbum, et Verbum erat apud Deum, et Deus erat Verbum. [ A ] II erat in principio apud Deum; III Omnia per ipsum facta sunt: et sine ipso factum est nihil, quod factum est. IV In ipso vita erat, [ b ] et vita erat lux hominum. Et lux in tenebris lucet V [ c ], et tenebrae eam non comprehenderunt.

VI fuit homo missus a Deo, cui nomen erat Ioannes. VII hic venit in testimonium, ut testimonium perhiberet de lumine, ut omnes crederent per illum. VIII, non erat ille lumen, sed ut testimonium perhiberet de lumine.

IX Quod lux vera quae inluminat omnem hominem venientem in hunc mundum. X In mundo erat, et mundus per ipsum factus est, et mundus eum non cognovit. XI Et factum est in patria sua, et populi sui eum non receperunt. XII Et omnes, qui accipit eum, qui crediderunt in nomine ejus, et dedit eis potestatem filios Dei; XIII, qui nati sumus, non ex sanguinibus, neque ex voluntate carnis neque ex voluntate viri, sed ex Deo.

XIV Et Verbum caro factum est et habitavit in nobis plenus gratia et veritas; et vidimus gloriam ejus, gloriam quasi Unigeniti a Patre. XV (Iohannes testimonium perhibet de ipso, et clamat, "Hic erat, quem dixi: Qui post me venturus est, ante me factus est quia prior me. ") XVI Et de plenitudine eius nos omnes accepimus, gratiam ad gratiam. XVII quia lex per Moysen data est; factum est gratia et veritas per Jesum Christum. XVIII nemo vidit unquam; Filius unicus [ d ], qui est in sinu Patris, ipse enarravit.

Testimonium Iohannis Baptistae

XIX Et hoc est testimonium Iohannis quando miserunt Iudaei ab Hierosolymis sacerdotes et Levitas de Hierusalem et redisset ipsum interrogate: "Quis es tu?" XX et confessus est et non negavit et confessus est: "Non sum ego Christus". XXI, et et interrogaverunt eum: "Quid ergo? Helias es?" "Dixit ille:" Ego sum "." Propheta es tu? "Et ille respondit:" Non "non XXII Dixit ergo

ad eum: « Tu quis es? Ne quis es ut responsum demus his qui miserunt nos. Quid dicis de te ipso? "XXIII Qui ait: " Ego vox clamantis in deserto: Dirigite viam Domini, sicut dixit Isaias propheta ".

XXIV Et qui missi fuerant, erant ex pharisæis. XXV et interrogavit illum: "Quid ergo baptizas, si tu non es Christus, neque Elias, neque propheta?" Respondit eis Iohannes XXVI, 'ego baptizo in aqua: quis autem vestrum stetit quem vos non scitis: XXVII et qui post me, cujus non sum dignus ut solvam eius corrigiam calceamenti ". XXVIII haec in Bethania facta sunt trans Iordanem, ubi erat Ioannes baptizans.

In Apocalypsi, Agnus Dei

XXIX Et altera die videt Iohannes Iesum venientem ad se et ait: "Ecce agnus Dei, qui tollit peccatum mundi? [ E ] XXX Hic est de quo dixi: Post me venit vir, qui ante me factus est quia prior me erat. XXXI ego nesciebam eum: Sed propterea veni ego in aqua baptizans ut manifestetur Israel ». Et testimonium perhibuit XXXII" Vidi Spiritum descendentem quasi columbam de caelo et mansit super eum. XXXIII Et ego nesciebam eum: sed qui misit me baptizare in aqua ille mihi dixit super quem videris Spiritum descendentem et manentem super eum hic est qui baptizat in Spiritu sancto. XXXIV Et ego vidi: et testimonium perhibui quia hic est Filius Dei ".

The First Disciples Iesu

XXXV postero die iterum stabat Iohannes et ex discipulis eius duo, XXXVI Et respiciens Iesum ambulans, et ait: "Ecce agnus Dei" XXXVII Et audierunt eum duo discipuli loquentem et secuti sunt Iesum. XXXVIII Iesus conversus, et videns eos sequentes se, dicit illis: "Quid quaeris?" Et illi dixerunt ei: "Rabbi" (quod dicitur interpretatum Magister), "ubi habitas?" XXXIX Et ait ad illos ' Veni et vide ". venerunt ergo et viderunt, ubi maneret, et apud eum manserunt die illo hora autem erat quasi decima. XL unus ex duobus qui audierant a Joanne, et secuti fuerant eum Erat autem Andreas, frater Simonis Petri:. XLI invenit hic primum fratrem suum Simonem, et dicit ei: "Invenimus Messiam" (quod est interpretatum Christus). XLII Et adduxit eum ad Iesum. Intuitus autem eum Iesus, et dixit, "ergo tu es Simon filius Iohanna Tu vocaberis Cephas "(quod significat Petri [ f ]).

Jesus Calls Philip and Nathanael:

XLIII In crastinum voluit exire in Galilaeam. Et invenit Philippum et dicit ei: "Sequere me". XLIV Erat autem Philippus a Bethsaida, civitate Andreae et Petri. XLV invenit Philippus Nathanahel et dicit ei: "Invenimus ei quem scripsit Moses in lege et prophetae invenimus Jesum a Nazareth, filium Ioseph a Nazareth". XLVI dixit ei Nathanahel "a Nazareth potest aliquid boni esse?" dicit ei Philippus: "veni et vide". XLVII vidit Iesus Nathanahel venientem ad se et dicit de eo: "Ecce vere Israelita, in quo dolus non est dolus, "XLVIII Nathanahel et dicit ei:" Quomodo nosti me? "respondit Iesus ei:" Priusquam te Philippus vocaret, cum esses sub ficu, vidi te ". XLIX Nathanahel respondit ei: "Rabbi, tu es Filius Dei? Tu es Rex Israel! "L Iesus ait ei:" Quia dixi tibi vidi te sub ficu, credis? Et videbunt maiora quam haec ". LI Ille autem dixit ei:" Amen, amen dico vobis, videbitis caelum apertum, et angelos Dei ascendentes, et descendentes supra Filium hominis ".

*Laus tibi Domine Jesu Christe.*



## 9. Appendix F: Revised Standard Version (Catholic Edition) with *Interpretor*

*Initium Sancti Evangelii secundum Joannem.*<sup>13</sup>

in initiō erat verbum , et verbō erat cum Deō , et verbum \*Deus<V><imperf><ind><passive><sg><3>

.

erat in initiō cum Deō ; omnēs rēs faciēbantur per eum , et sine erat nōn alius factus faciēbātur .

in erat vīta , et vītae erat lūcis hominum .

lūcidōrum fulgōrum in obscuritāte , et obscuritās habent nōn convinceris id .

erat homō dēstinātus ex Deō , cuius cognōmen erat Iōannē .

veniēbat \*testimony<N><masc><sg><dat> , gereris servātōrem ad lūcem , ut omnia arbitrārētur per eum .

erat nōn lūx , sed veniēbat gereris servātōrem ad lūcem .

vērus lūx illūstrat omnēs hominem \*coming<V><imperf><ind><passive><sg><3> in terram .

erat in terrā , et terra faciēbātur per eum , at terra sciēbat eum nōn .

veniēbat ad suam domum , et suae gentēs excipiēbant eum nōn . sed ad omnia excipiēbat eum , arbitrābātur in eius cognōmine , perhiberet nervum fieri infantēs Deī ; gerēbantur , nōn \*bland<N><masc><sg><gen> nec tabulae \*flesh<ADJ><positive><masc><sg><gen> nec tabulae hominis , sed Deī .

et verbum fiēbat pulpam et \*dwelt<V><imperf><ind><active><sg><3> apud nōs , \*full<ADJ><positive><neut><sg> honōris et vērītātis ; \*beheld<V><perf><ind><passive><pl><1> eius glōriam , \*glory<ADJ><positive><neut><sg> sicut sōlī filiī ex patre .

Iōannis \*bore<N><masc><sg><gen> servātōris ad eum , et lacrimābat , " erat dē dicāret , ' veniat post \*rank<V><pres><subj><active><sg><3> ante mē , erat ante . '

" ) et ex eius plēnitūdine habet absolūte excipiēbat , honōrem in honōre .

lēgī perhibēbātur per \*mose<N><masc><pl><acc> ; honōrem et vērītās \*came<V><imperf><ind><active><sg><3> per \*Iesus<PN><masc><sg><gen> Chrīstum .

nūllum ūnum umquam speciō Deum ; sōlus filiū , est in gremiō patris , faciō eum scītus .

et est \*testimony<N><masc><sg><gen> Iōannis , quandō \*jew<N><masc><pl><nom> \*sent<V><pres><ind><a>  
presbyterōs et \*levite<PN><masc><pl><acc> ex Hierosolyma scītārī eum , " est ? "  
cōnfītēbātur , faciēbat nōn dēnegāris , sed cōfessus , " sum nōn Chrīstum . "  
et scītābantur eum , " quōs deinde ?  
est \*eli<PN><masc><sg><nom> ' \*jah<INTJ> ? "  
dicābat , " sim nōn . "  
" est prophētē ? "  
et respondēbat , " nō . "  
dicābant ad eum deinde , " est ?  
dēsereris nōs habēris respōsum illīs \*sent<V><imperf><ind><active><pl><3> nōs .  
quī facit dicāris dē tē ? "  
dicābat , " sum vōcis dē ūnūs lacrimātī in \*wilderness<N><masc><sg><abl> , ' \*make<PN><masc><sg><nom>  
\*straight<V><pres><inf><active> viam dominī , ' ut prophētē \*isaiah<PN><masc><sg><nom>  
dicāret . "  
hodiē dēstinātī erant ex \*pharisee<PN><masc><sg><abl> .  
scītābantur eum , " deinde \*why<CONJ> est baptizō , \*if<CONJ> est neque Chrīstum , nec  
\*eli<PN><masc><sg><abl> ' \*jah<INTJ> , nec prophētē ? ”  
Iōannē respondēbat eōs , " baptizem cum latice ; sed apud \*stand<V><pres><ind><active><sg><3>  
ūnum quī facit nōn scīris , etiamnum venit post mē , \*thong<N><masc><sg><gen> cuius sandaliī  
sum nōn \*worthy<V><pres><inf><active> solveris . "  
capessēbat locum in \*bethany<PN><masc><sg><abl> ultrā \*jordan<N><masc><sg><acc> , ubi  
Iōannē erat \*baptize<ADJ><positive><neut><sg><nom> .  
proximus diēs speciēbat \*Iesus<PN><masc><sg><acc> veniō ad eum , et dicābat , " \*be-  
hold<PN><masc><sg><nom> , \*lamb<PN><masc><sg><gen> Deī , capessit \*away<PREP>  
crīmen terrae !  
est dē dicābat , ' post veniat hominem \*rank<V><pres><ind><active><sg><3> ante mē , erat  
ante . '

faciēbat nōn scīris eum ; sed huic veniēbam baptizātō cum latice , ut revēlārētur ad Isrāēlem .  
 et Iōannis \*bore<N><masc><sg><gen> servātor , " speciēbat spīritūs \*descend<N><masc><sg><acc>  
 ut \*dove<N><masc><sg><abl> ex aethere , et remanēbat super eō .  
 faciēbat nōn scīris eum ; sed dēstinābat mē baptizāris cum latice dicābat ad mē , ' super speciat  
 spīritūs \*descend<N><masc><sg><acc> et remanet , est baptizat cum sānctus spīritū . '

et speciō et habēris \*borne<N><masc><sg><gen> servātōrem est filiū dīvī . "

proximus diēs \*again<ADV> Iōannē \*stand<V><imperf><ind><passive><sg><3> cum duae  
 eius discipulōrum ; et aspectābat in \*iesus<N><masc><pl><abl> sicut ambulāret , et dicābat , "

\*behold<PN><masc><sg><nom> , \*lamb<PN><masc><sg><gen> Deī ! "

duae discipulī audiēbant dicāris hunc , et labōrābant \*Iesus<PN><masc><sg><acc> .

\*iesus<N><masc><pl><nom> versī , et speciēbat eōs labōrātōs , et dicābat ad eōs , " quī facit  
 cōnsectārī ? "

et dicābant ad eum , " \*rabbi<PN><masc><sg><nom> " dēclārat teacher) , " ubi est plācō ? "

dicābat ad eōs , " venīre et speceris . "

veniēbant et \*serro<V><imperf><ind><active><sg><3> ubi erat plācō ; et plācābant cum eō  
 diēs , erat dē \*tenth<ADJ><positive><masc><sg><dat> \*hour<N><masc><sg><dat> .

ūnum dē duae audiēbat Iōannis \*speak<N><masc><sg><acc> , et labōrābat , erat \*andrew<PN><masc><sg><nom>  
 , \*simon<PN><masc><sg><gen> \*peter<PN><masc><sg><nom> \*s<ADJ><positive><masc><sg><gen>  
 frātris .

\*first<ADV> inveniēbat eius frātrem \*simon<PN><masc><sg><nom> , et dicābat ad eum , "

inveniō \*messiah<PN><masc><sg><acc> " dēclārat \*christ)<N><masc><sg><acc> .

trānsferēbat eum ad \*Iesus<PN><masc><sg><acc> .

\*iesus<N><masc><pl><nom> aspectātī in eō , et dicābat , " ita est \*simon<PREP> filiō Iōannis  
 ?

dicāberis \*cephas<PN><masc><sg><nom> " dēclārat \*peter)<N><masc><pl><acc> .

proximī diēi \*iesus<N><masc><pl><nom> dēcernēbant īre ad \*galilee<PN><masc><sg><acc>

.

et inveniēbat \*philip<N><masc><sg><acc> et dicābat ad eum , " labōrāris mē . "

hodiē \*philip<PN><masc><sg><abl> erat ex \*beth<PN><masc><sg><abl> - \*sa<X> ' \*ida<X>  
, cīvītātis \*andrew<PN><masc><sg><gen> et \*peter<PN><masc><sg><abl> .

\*philip<N><masc><sg><nom> inventus \*nathan<PREP> 's - altitūdine , et dicābat ad eum , " in-  
veniō eum \*mose<N><masc><pl><gen> in lēge et quoque prophētae \*wrote<V><imperf><ind><active><pl><3>  
, \*Iesus<PN><masc><sg><acc> \*nazareth<PN><masc><sg><gen> , filiī Iōsēphī . "

\*nathan<PREP> ' - altitūdō dicābat ad eum , " possum alius mātūrum venīre ex \*nazareth<PN><masc><sg><gen>  
? "

\*philip<N><masc><sg><nom> dicābat ad eum , " venīre et speceris . "

\*iesus<N><masc><pl><nom> \*serro<V><pres><ind><active><pl><3> \*nathan<PREP> ' - al-  
titūdine veniō ad eum , et dicābat eius , " \*behold<PN><masc><sg><nom> , \*israelite<ADJ><positive><masc><sg>  
\*indeed<N><masc><sg><nom> , in est nūllum astum ! "

\*nathan<PREP> ' - altitūdine dicābat ad eum , " quōmodo facit sciās mē ? "

\*iesus<N><masc><pl><nom> respondēbant eum , " ante \*philip<PN><masc><sg><nom>  
dicāret tē , quandō erat sub \*fig<ADJ><positive><fem><sg><abl> arbore , speciēbam tē . "

\*nathan<PREP> ' - altitūdine respondēbat eum , " \*rabbi<PN><masc><sg><gen> , est filiī Deī !  
est rēgnātōris Isrāēlis ! "

\*iesus<N><masc><pl><nom> respondēbant eum , " quoniam dicārem ad tē , speciēbam tē sub  
ficī arbore , facit arbitrārī ?

speciēs \*greate<ADJ><comparative><fem><pl><acc> rēs quam hīs . "

et dicābat ad eum , " vērūm , vērūm , dicem ad tē , speciēs aethēr \*open<V><imperf><subj><active><sg><3>  
, et angelōrum Deī \*ascend<V><part><perf><passive><masc><pl><gen> et dēgressī in filiō homi-  
nis . "

*Laus tibi Domine Jesu Christe.*

## Notes

<sup>8</sup>John 1, <https://www.sacred-texts.com/bib/vul/joh001.htm>

<sup>9</sup>John 1, <https://www.biblegateway.com/passage/?search=john+1&version=DRA>

<sup>10</sup>John 1, <https://tinyurl.com/john-douay-google>

<sup>11</sup>John 1, <https://www.biblegateway.com/passage/?search=john+1&version=RSVCE>

<sup>12</sup>John 1, <https://tinyurl.com/john-rsvce-google>

<sup>13</sup>John 1