# An Experiment in CILI-Based Validation: The Case of the Estonian Wordnet

**Ahti Lohk[1]** and **Heili Orav[2]**

[1]Department of Software Science, Tallinn University of Technology, Tallinn, Estonia
[2] Department of Computer Science, University of Tartu, Tartu, Estonia

`<ahti.lohk@taltech.ee,`
`heili.orav@ut.ee>`

## Abstract

This paper presents a novel approach to validating wordnet structure by leveraging cross-lingual comparison through the Collaborative Interlingual Index. Focusing on the Estonian Wordnet, we hypothesize that the absence of a CILI-linked English synset between two consecutive Estonian synsets in a hypernymy chain may indicate a structural or semantic inconsistency. We propose a method for automatically detecting such inconsistencies and apply it to the Estonian Wordnet, analyzing the results to identify potential areas for improvement. Our findings contribute to the ongoing efforts to enhance the quality and reliability of language-specific wordnets and offer valuable insights for the development and maintenance of these resources.

## 1 Introduction

In the rapidly evolving field of natural language processing, resources that provide structured lexical-semantic information remain invaluable. Wordnets, as lexical databases that organize words into sets of synonyms (synsets) connected through semantic relations like hypernymy (is-a) and hyponymy (is-a-kind-of), offer a hierarchical network of concepts that support various language-related applications (Fellbaum, 1998). While large language models (Zhao et al., 2023; Naveed et al., 2023) have transformed NLP by enabling machines to generate and understand text with remarkable fluency, wordnets continue to play a critical role in tasks that require explicit semantic relationships and structured knowledge. Ensuring the quality and completeness of wordnets is therefore essential for enhancing the effectiveness of these applications and for integrating structured semantic information into advanced NLP systems.

Cross-lingual comparison offers a valuable approach to validating wordnet structure and identifying potential inconsistencies. The Collaborative Interlingual Index (CILI) provides a framework for this purpose by linking wordnet-like resources across multiple languages (Bond et al., 2016). This interconnectedness allows for the examination of synset correspondences and the detection of potential discrepancies in semantic relations across different language editions. CILI has been instrumental in enabling the integration of multiple wordnets and addressing challenges like **structural issues** such as loops or cycles in hypernymy chains, **duplicate senses** where the same concept is represented multiple times, and **semantic misalignments** between synsets in different wordnets (Bond et al., 2020). Furthermore, CILI can help identify **non-lexicalized synsets**, where a concept exists in one language but not in another, thereby supporting better multilingual alignment.

Researchers have explored various ways to utilize CILI for wordnet validation and enhancement. For instance, (Lohk et al. 2023) employed CILI to identify and potentially rectify "parentless" synsets in the Estonian Wordnet (Orav et al., 2019), highlighting the potential of cross-lingual analysis in improving wordnet structure. (Slaughter et al., 2018) demonstrated how CILI can be leveraged for cross-linguistic analysis in specific domains, showcasing its versatility in addressing domain-specific inconsistencies.

This paper builds upon our previous experiment (Lohk et al. 2023), which focused on utilizing CILI and other wordnets to validate semantic relations

within the Estonian Wordnet. While our prior work aimed to automatically identify and potentially rectify "parentless" synsets by finding missing relations, this study shifts the focus to identifying existing relations that might require modification or replacement. In essence, we aim to determine whether certain established connections within the Estonian Wordnet's structure should be broken and replaced with more accurate alternatives.

This paper presents an experiment aimed at identifying potential structural inconsistencies in the Estonian Wordnet by leveraging its connections to the Open English WordNet (Oewn) through the Collaborative Interlingual Index (CILI) (McCrae et al., 2019). The focus of this experiment is on identifying cases where two consecutive Estonian synsets, connected via an IS-A (hypernym) relationship and both mapped to CILI identifiers (CILI: i1 and CILI: i2), do not have an intermediate synset between them in the Estonian Wordnet, although such a synset does exist in the Open English WordNet (see Figure 1).
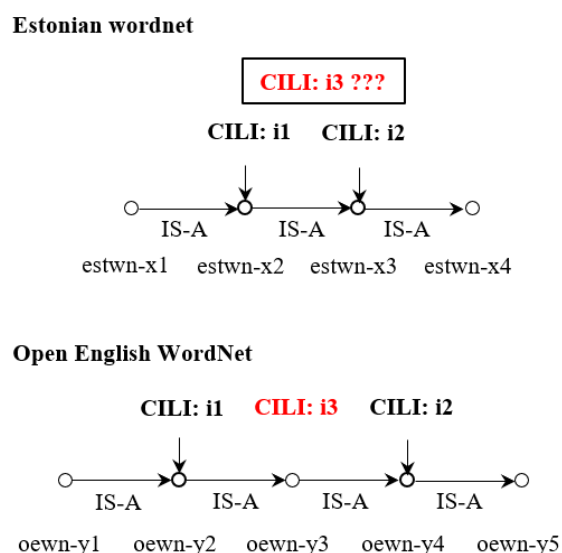


Figure 1: Identifying structural misalignments in hypernymy chains between the Estonian Wordnet and Open English WordNet via CILI

Specifically, we are interested in cases where an intermediate synset (CILI: i3), present between CILI: i1 and CILI: i2 in the Open English WordNet, is also present in the Estonian Wordnet but is not positioned between these two synsets. This indicates that while the synset corresponding to CILI: i3 exists in both wordnets, its placement in the IS-A hierarchy differs. We hypothesize that such discrepancies could reveal structural or semantic inconsistencies within the Estonian Wordnet.

The following sections of this paper will delve into the methodology employed for this analysis, present the statistical findings, and discuss the types of inconsistencies observed in the Estonian Wordnet. The insights gained from this study contribute to the ongoing efforts to improve the quality and reliability of the Estonian Wordnet and offer valuable lessons for the development and maintenance of other language-specific wordnets.

## 2 Methodology

### 2.1 Research Questions

This study investigates the potential of using the Collaborative Interlingual Index for identifying structural inconsistencies within the Estonian Wordnet. Specifically, we examine the following hypothesis:

**The presence of a CILI-linked English synset between two consecutive Estonian synsets in a hypernymy chain, where this intermediate synset(s) also exists in the Estonian Wordnet but is not positioned between these two synsets, may indicate a structural or semantic misalignment in the Estonian Wordnet** (see Figure 1)**. This misalignment could suggest incomplete or incorrect modeling of hierarchical relationships within the Estonian Wordnet.**

This research aims to explore this hypothesis by developing and applying a method for automatically detecting such inconsistencies within the Estonian Wordnet. The findings will be analyzed to identify potential areas for improvement in the Estonian Wordnet's structure and to assess the broader applicability of CILI-based validation for language-specific wordnets.

### 2.2 Data

This experiment utilizes data from two wordnets:
- **Open English WordNet (version 2023)[1]** (McCrae et al., 2019)

- **Estonian Wordnet (version 2.6.0)**[2] (Orav et al., 2019)

## 2.3 Methodological Approach

To identify potential inconsistencies in the Estonian Wordnet, this study employs a systematic, CILI-driven approach. The methodology comprises the following steps:

**Data Extraction and Preparation**: Synset data is extracted from the XML-formatted datasets of both the Open English WordNet and the Estonian Wordnet. This includes parsing synsets to obtain their associated words, definitions, hypernym relations, and CILI identifiers.

**Hypernymy Chain Construction**: Hypernymy chains are constructed for each Estonian synset, tracing the "is-a" relationships between synsets from specific concepts to more general concepts. This step maps the hierarchical structure within the Estonian Wordnet.

**CILI-Based Inconsistency Detection:** The core of the methodology lies in identifying structural gaps in CILI linkages within the hypernymy chains of the Estonian Wordnet. For each Estonian synset's IS-A chain, we compare it against its corresponding English counterpart in the Open English WordNet (if available through CILI). Specifically, we flag cases where an English synset (linked via CILI) exists between two consecutive Estonian synsets but does not occupy the same position in the Estonian Wordnet. These cases are treated as potential structural or semantic inconsistencies, as the intermediate synset is present in both wordnets but misaligned within the Estonian hierarchy.

**Lexicographical Review and Correction:** The flagged inconsistencies are reviewed by a professional lexicographer to assess their validity. This step involves manual examination and correction of the identified issues within the Estonian Wordnet, ensuring that any structural or semantic problems are accurately addressed.

**Result Analysis**: The identified inconsistencies are collected and analyzed to pinpoint specific areas within the Estonian Wordnet that may require further examination and potential refinement.

This hybrid methodology leverages automated cross-lingual comparisons facilitated by CILI alongside manual lexicographical review to provide insights into the structural integrity of the Estonian Wordnet and to suggest targeted improvements.

## 2.4 Tools

The Python programming language, along with the xml.etree.ElementTree module, was used for reading the wordnets data and traversing the hierarchical structures. All codes developed for this experiment are available in the GitHub repository[3].

## 2.5 Limitations

This study operates under several limitations that may impact on the comprehensiveness and generalizability of the findings.

| Word-net | Synset Cate-gory | Total Synsets | CILI-Linked Synsets | CILI Cove-rage (%) |
|---|---|---|---|---|
| **OEWN** | Overall | 120,135 | 120,135 | 100.0% |
| | Used synsets | 98,299 | 98,299 | 100.0% |
| | - Nouns | 84,463 | 84,463 | 100.0% |
| | - Verbs | 13,836 | 13,836 | 100.0% |
| **EstWN** | Overall | 92,214 | 25,798 | 29.1% |
| | Used synsets | 84,377 | 22,150 | 26.2% |
| | - Nouns | 77,610 | 19,979 | 25.7% |
| | - Verbs | 6,767 | 3,171 | 46.9% |

Firstly, the coverage of the Collaborative

Table 1: CILI coverage in OEWN and EstWN

Interlingual Index (CILI) within the Estonian Wordnet (EstWN) is notably incomplete. Out of 92,214 total synsets in EstWN, only 25,798 synsets (29.06%) are equipped with CILI links. Focusing exclusively on noun and verb synsets, the dataset comprises 84,377 synsets, of which 77,610 are nouns and 6,767 are verbs. Among these, 19,979 noun synsets (25.7%) and 3,171 verb synsets (46.9%) have associated CILI links. In contrast, the Open English WordNet (OEW) exhibits complete CILI coverage for its noun and verb synsets, with all 120,135 synsets (100%) fully linked. Specifically, the subset of noun and verb synsets

---

[2] **Estonian Wordnet**, version 2.6.0. Available at: https://gitlab.keeleressursid.ee/avalik/data/-/tree/master/estwn/estwn-et-2.6 (downloaded file: *estwn-et-2.6.0.xml*).

[3] https://github.com/ahtilohk/GWC2025

used in this experiment includes 98,299 synsets, consisting of 84,463 nouns (85.9%) and 13,836 verbs (14.1%), all of which are CILI-equipped.

The limited CILI coverage in EstWN restricts the analysis to a subset of synsets, potentially overlooking inconsistencies present in the unlinked portions of the network. Additionally, the focus on only noun and verb synsets excludes other parts of speech.

## 3 Results and Discussion

### 3.1 Overview of Detected Inconsistencies

The application of our CILI-based methodology to the Estonian Wordnet (EstWN) revealed several types of inconsistencies within the hypernymy chains. These inconsistencies can be categorized into four main areas:

- **Imprecise Hypernyms**: Instances where a synset's hypernym is overly general and can be refined to a more specific concept (see Appendix A).

- **Cultural and Linguistic Divergences**: Differences arising from cultural or societal perspectives that affect the alignment between Estonian and English synsets (see Appendix B).

- **Taxonomic Hierarchy Issues**: Confusions within biological classifications, leading to incorrect hierarchical representations (see Appendix C).

- **Translation Challenges:** Concepts that are not lexicalized in Estonian, making direct translation or alignment inappropriate (see Appendix D).

### 3.2 Statistical Findings

A total of 650 Estonian synsets were reviewed using our methodology[4]. This analysis led to the identification and correction of inconsistencies in 77 synsets, thereby improving approximately 11.8% of the examined hierarchies. The corrections are detailed as follows:

- **Hypernym Refinement**: In 63 cases, the existing hypernym was refined to a more precise concept (see Appendix A). For

example, refining the hypernym of "amphibolite" from "rock" to "metamorphic rock" enhances the accuracy of geological classifications within the wordnet.

- Hypernym Replacement: In 14 cases, a completely new hypernym was identified and assigned (see Appendix A). This replacement ensures that the synsets more accurately reflect the intended meanings and relationships.

- **Adjustments to English Connections**: Corrections were made to some English synset associations where errors were found, ensuring better alignment between Estonian and English WordNets (see Appendix A).

These findings demonstrate the effectiveness of our methodology in detecting and addressing specific inconsistencies. However, they also highlight areas, such as biological taxonomies, where further improvements are necessary to achieve comprehensive accuracy.

### 3.3 Examples of Inconsistencies and Corrections

Each example provided in the appendices illustrates the nature of the inconsistency and the corresponding correction applied. The appendices present detailed synset paths and CILI identifiers to facilitate a deeper understanding of each case.

**Appendix Structure Explanation:**

- **Focus path** refers to the chain of synsets in the wordnet under observation, which in our case is the Estonian Wordnet (EstWN). This path illustrates the hierarchy leading from the specific synset up to its root within EstWN.

- **Reference path** refers to the chain of synsets in the wordnet through which potential errors are attempted to be identified. For this purpose, we use the Open English WordNet (OEWN). The Reference Path includes OEWN synsets linked via CILI to corresponding EstWN synsets, aiding in pinpointing discrepancies.

---

[4] Out of 2052 synsets, 1959 were nouns and 93 were verbs.

- **Arrow (→)** indicates a potential problem area through a range of arrows.

- **CILI identifiers** provide a unique reference to each synset, facilitating easy navigation and cross-referencing between EstWN and OEWN.

- **Path continuation (…)** indicates that the full path from the synset to the root is not displayed in the appendices to conserve space. In actual results, the complete hierarchical path is available to provide context for each inconsistency.

### 3.3.1 Example 1: Refinement of Hypernyms

- **Concept**: Amphibolite (*amfiboliit*)

- **Original hypernym**: Rock, Stone

- **Refined hypernym**: Metamorphic Rock

- **Discussion**: The initial hypernym "rock" was too broad, encompassing a wide range of geological materials. By refining it to "metamorphic rock," we provide a more accurate classification that benefits applications requiring detailed geological information. This refinement aligns the EstWN more closely with precise scientific terminology, enhancing its utility for specialized fields. (See Appendix A for detailed paths)

### 3.3.2 Example 2: Cultural and Linguistic Divergences

- **Concept**: Riesling (*riisling*); baba (*baaba*); muffin (*muffin*)

- **Original English hypernym**: Rhine Wine, Rhenish; cake; quick bread

- **Estonian consideration**: The term "Rhine wine" is not commonly used in Estonian. Instead, Estonians classify Riesling primarily by grape variety rather than region. Additionally, distinctions such as savory versus sweet pastries are handled differently – *baba* is under baked goods and muffin is kind of pie in EstWN.

- **Discussion**: Those divergences underscore the importance of cultural context in wordnet alignment. There always are some nuances what are differently made or understood in

vocabulary of edible stuff. (See Appendix B for detailed paths)

### 3.3.3 Example 3: Taxonomic Hierarchy Issues

- **Concept**: Ocelot (*otselot*)

- **OEWN hierarchy**:

  Ocelot > Wildcat > True Cat, Cat > Feline, Felid

- **Issue**: In Estonian, "cat" is primarily associated with domestic cats rather than the broader category of felines. This misalignment incorrectly suggests that an ocelot is a type of domestic cat.

- **Discussion**: This example highlights the necessity for standardized taxonomic terms within EstWN. Correcting the hierarchy to accurately place "ocelot" within the broader category of felines, rather than domestic cats, ensures that biological classifications are both accurate and meaningful within the Estonian context. (See Appendix C for detailed paths)

### 3.3.4 Example 4: Translation Challenges

- **Concepts**: Change of Magnitude, Animal Tissue, Popular Music Genre, Imperial Decree

- **Issue**: These concepts lack direct lexical equivalents in Estonian, complicating their translation and alignment within the Open English WordNet.

- **Discussion**: The absence of direct Estonian equivalents for these terms indicates a need for careful consideration when incorporating such concepts into EstWN. It may be necessary to omit certain concepts that do not align well with Estonian linguistic and cultural contexts to maintain the relevance and accuracy of the wordnet for Estonian users. (See Appendix D for detailed paths)

## 3.4 Hypernym Refinement

The identification of imprecise hypernyms often results from the historical development of EstWN, which has been under continuous improvement since 1998. Early contributors may have selected the best available hypernym at the time, even if a more precise term existed but was not yet included

in the database. Our methodology facilitated the revisitation and refinement of these hypernyms, thereby enhancing the accuracy and utility of the wordnet. For instance, updating the hypernym of "amphibolite" from "rock" to "metamorphic rock" not only corrects the classification but also supports applications requiring detailed geological information. (Refer to Appendix A for specific examples)

### 3.5 Cultural and Linguistic Specificities

Discrepancies between the Estonian WordNet (EstWN) and the Open English WordNet often highlight deeper cultural and linguistic differences. These differences are particularly evident in the domains of food and drink, which serve as clear demonstrations of cultural specificities. For instance, the classification of "Riesling" illustrates how wine categories vary across cultures. While English speakers might group Riesling under the broader category of "Rhine wine," Estonians typically classify it based on the grape variety, irrespective of the production region. The classification of Riesling in the English WordNet appears problematic, as its definition states that it can originate from California, yet its hypernym is restricted to German wines.

Similarly, other examples underscore divergences in the conceptualization of everyday items. In Estonian, *baba* is categorized as a type of pie rather than a cake, diverging from the English understanding. Additionally, distinctions such as savory versus sweet pastries are handled differently in the respective wordnets.

Beyond food, cultural differences extend to other domains: for example, a "beretta" is understood in Estonian as a headdress, not simply a hat, and a "rock group" is not equated with a "dance orchestra."

These examples illustrate the importance of cultural context in aligning wordnets across languages. A straightforward one-to-one mapping is often inadequate and may fail to capture the nuances of language-specific conventions. Adaptations must respect the linguistic and cultural frameworks of individual languages to ensure classifications are both meaningful and accurate. For instance, while "country music" is invariably associated with American folk traditions in the English WordNet, it holds far less cultural relevance in Estonian contexts.

These findings underscore the necessity of culturally informed approaches when integrating or comparing wordnets. Without such considerations, the resulting classifications risk being misaligned or culturally irrelevant, undermining their utility and coherence. (Refer to Appendix B for detailed instances)

### 3.6 Taxonomic Hierarchies in EstWN

Biological classifications within EstWN revealed significant inconsistencies, particularly in the representation of animal hierarchies. Traditional taxonomic principles, as established by Carl von Linné, emphasize hierarchical categorization. However, EstWN's current representation often lacks this standardization. The "ocelot" example demonstrates this issue, where the hierarchy incorrectly places the ocelot within the category of domestic cats rather than the broader felines. The OEWN synset for 'cat' refers to all domestic and wild cats. Felis catus denotes the name of a group of animals in zoology and is therefore not an exact match. Establishing standardized taxonomic terms and structures within EstWN is essential for accurate biological representation and to avoid confusion in hierarchical relationships. (Refer to Appendix C for detailed paths)

### 3.7 Translation and Lexicalization Challenges

Certain concepts present in the Open English WordNet are not lexicalized in Estonian, posing significant translation and alignment challenges. Terms such as "change of magnitude," "imperial decree," and "popular music genre" are compositional terms and those are not frequent in Estonian. Making their inclusion in the hierarchy of hypernymy of EstWN seems too artificial. This finding suggests the need for a selective approach when incorporating concepts into EstWN, potentially omitting those that do not align with the Estonian linguistic and cultural context. Careful consideration is required to maintain the relevance and accuracy of the wordnet for Estonian users. (Refer to Appendix D for detailed examples)

## 4   Conclusion

This study demonstrates the potential of leveraging the Collaborative Interlingual Index (CILI) for detecting and addressing structural inconsistencies in wordnets. By applying a cross-lingual comparison methodology to the Estonian Wordnet

(EstWN), we identified and corrected various types of inconsistencies, thereby improving the wordnet's accuracy and reliability.

**Key contributions of this research include:**

- **Enhanced Precision**: Refining hypernyms to more specific concepts improve the semantic accuracy of EstWN.

- **Cultural and Linguistic Nuance**: Acknowledging and respecting the unique cultural contexts of different languages ensures that synset relationships are appropriately mapped, recognizing that concepts in one language may not directly correspond to those in another.

- **Standardized Taxonomies**: Highlighting the need for consistent biological classifications within EstWN.

- **Methodological Framework**: Providing a systematic approach that can be applied to other language-specific wordnets.

Our CILI-based methodology proved effective in identifying and correcting structural inconsistencies in EstWN. By refining hypernyms, adjusting for cultural and linguistic differences, addressing taxonomic misalignments, and considering translation challenges, we improved approximately 11.8% of the reviewed synsets. These findings suggest that while the methodology addresses key inconsistencies, there is room for further refinement, particularly in areas such as biological classifications and cultural-specific synsets.

### 4.1 Limitations and Future Work

Despite these advancements, the study is constrained by the incomplete coverage of CILI in EstWN, as illustrated in Figure 1 and detailed in the appendices. Specifically, within the Open English WordNet (OEWN), a synset must exist between arrows that is also present in EstWN. Removing this constraint could reveal additional synsets in OEWN that exist in EstWN but are currently unlinked due to incomplete CILI coverage. Our experiment identified 1,052 initial cases out of 10,056, representing approximately 10%, indicating that many potential inconsistencies remain undetected.

**Future work** should focus on semi-automatically identifying new CILI links for EstWN and assigning them to the appropriate synsets. One promising approach involves utilizing multilingual embedding models, such as LaSBE (Chen et al., 2020) or mBERT,(Devlin et al., 2018) to vectorize both EstWN and OEWN synsets along with their definitions. Additionally, CILI identifiers can serve as confirmatory indicators to ensure that assigning a CILI to an EstWN synset is semantically appropriate.

### 4.2 Final Remarks

Our findings support ongoing efforts to enhance wordnet quality and suggest that cross-lingual comparison, when thoughtfully applied, is a valuable tool for wordnet maintenance and development. By addressing both existing inconsistencies and expanding the methodological framework, this research contributes to the broader goal of creating robust and semantically accurate lexical resources.

### References

Fellbaum, D. C. 1998. WordNet: An Electronic Lexical Database. Cambridge: MIT Press

Bond, F., Da Costa, L.M., Goodman, M.W., McCrae, J.P. and Lohk, A., 2020, May. Some issues with building a multilingual wordnet. In Proceedings of the Twelfth Language Resources and Evaluation Conference (pp. 3189-3197).

Bond, F., Vossen, P., McCrae, J.P. and Fellbaum, C., 2016. Cili: the collaborative interlingual index. In *Proceedings of the 8th Global WordNet Conference (GWC)* (pp. 50-57).

Chen, Y.-C., Markov, K., Yao, Y., Wei, F., Duh, K., & Lei, J. (2020). *LaBSE: Language-agnostic BERT Sentence Embedding*. arXiv preprint arXiv:2007.09405.

Devlin, J., Chang, M.-W., Lee, K., & Toutanova, K. (2018). *BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding*. arXiv preprint arXiv:1810.04805.

Lohk, A. 2015. A System of Test Patterns to Check and Validate the Semantic Hierarchies of Wordnet-type Dictionaries. Tallinn, Estonia: TalTech Press.

McCrae, J.P., Rademaker, A., Bond, F., Rudnicka, E. and Fellbaum, C., 2019, July. English WordNet 2019 – An Open-Source WordNet for English. In Proceedings of the 10th Global WordNet Conference (GWC2019), pp 245-252.

Naveed, H., Khan, A. U., Qiu, S., Saqib, M., Anwar, S., Usman, M., ... & Mian, A. (2023). A comprehensive

overview of large language models. *arXiv preprint arXiv:2307.06435*.

Orav, H., Vare, K. and Zupping, S., 2018, January. Estonian Wordnet: Current State and Future Prospects. In Proceedings of the 9th Global Wordnet Conference, pp. 347-351.

Slaughter, L., Wang, W., da Costa, L.M. and Bond, F., 2018. Enhancing the Collaborative Interlingual Index for Digital Humanities: Cross-linguistic analysis in the domain of theology.

Zhao, W. X., Zhou, K., Li, J., Tang, T., Wang, X., Hou, Y., ... & Wen, J. R. (2023). A survey of large language models. *arXiv preprint arXiv:2303.18223*.

# Appendix A.  Refinement of Hypernyms

1591. Difference found (Noun):
    Focus path:
      → estwn-et-65507-n (amfiboliit) - CILI: i114043
      → estwn-et-3300-n (kivim, kivi) - CILI: i114224
    . . .
    Reference path:
      → oewn-14690548-n (amphibolite) - CILI: i114043 [Focus: estwn-et-65507-n (amfiboliit)]
        oewn-14722859-n (metamorphic rock) - CILI: i114233 [Focus: estwn-et-39141-n (metamorfiit, moondekivim)]
      → oewn-14720954-n (stone, rock) - CILI: i114224 [Focus: estwn-et-3300-n (kivim, kivi)]
    . . .

# Appendix B. Cultural and Linguistic Divergences

1137. Difference found (Noun):
    Focus path:
    → estwn-et-3888-n (reinvein) - CILI: i78749
    → estwn-et-497-n (vein) - CILI: i78715
      . . .
    Reference path:
    → oewn-07913175-n (Rhine wine, Rhenish, hock) - CILI: i78749 [Focus: estwn-et-3888-n (reinvein)]
      oewn-07908788-n (white wine) - CILI: i78718 [Focus: estwn-et-44240-n (valge vein)]
    → oewn-07907701-n (vino, wine) - CILI: i78715 [Focus: estwn-et-497-n (vein)]
      . . .

# Appendix C. Taxonomic Hierarchy Issues

1557. Difference found (Noun):
    Focus path:
      → estwn-et-63224-n (otselot) - CILI: i46619
      → estwn-et-11491-n (kaslane, kaslased) - CILI: i46591
      . . .
    Reference path:
    → oewn-02128146-n (ocelot, panther cat, Felis pardalis) - CILI: i46619 [Focus: estwn-et-63224-n (otselot)]
      oewn-02127275-n (wildcat) - CILI: i46615
      oewn-02124272-n (cat, true cat) - CILI: i46593 [Focus: estwn-et-11490-n (kodukass, kiisu, kass)]
    → oewn-02123649-n (feline, felid) - CILI: i46591 [Focus: estwn-et-11491-n (kaslane, kaslased)]
      . . .

# Appendix D. Translation Challenges

1530. Difference found (Noun):
Focus path:
→ estwn-et-61361-n (aktsiatükeldus) - CILI: i37705
→ estwn-et-1299-n (jaotamine, jagamine) - CILI: None
    . . .
 Reference path:
→ oewn-00439983-n (split up, stock split, split) - CILI: i37705 [Focus: estwn-et-61361-n (aktsiatükeldus)]
    oewn-00364086-n (step-up, increase) - CILI: i37323 [Focus: estwn-et-662-n (rohkendamine, rohkendus, suurendus, kasv, suurendamine)]
    oewn-00352311-n (change of magnitude) - CILI: i37257
→ oewn-00191991-n (change) - CILI: i36418 [Focus: estwn-et-534-n (muutmine)]
    . . .