Case Study C1-004
Structural Compliance in Patent NMT
Morphological Oscillation & Vertical Consistency

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Case Study Metadata

Dataset ID:	C1-004
Category:	Structural Compliance — Constraint 1
Focus:	Morphological Oscillation
Model:	Generic NMT
Domain:	Ophthalmic Optics (Lens Manufacturing)

1 The Context: Vertical Parallelism

In patent claims that involve complex steps (like Claim 13 of **MedTechClaims**), the list of instructions must adhere to the **Rule of Parallelism**. If the first step is introduced by a noun, every subsequent step in that list should ideally be a noun.

Generic NMT models translate sentence-by-sentence, often ignoring the vertical context of the list. This leads to "Morphological Oscillation"—a chaotic mix of infinitives, nouns, and participles within the same claim structure.

Key Concept

The "Uncanny Valley" of Grammar:
While individual lines might be grammatically correct in isolation, a list that switches between *"Déterminer..."* (Infinitive) and *"Sélection..."* (Noun) reads as unprofessional and legally disjointed. It signals a "raw" translation to the examiner.

2 The Glitch: The "Yo-Yo" Effect

In Claim 13, the generic model failed to maintain a consistent grammatical form for the method steps. It "forgot" the nominalization rule halfway through the list.

2.1 Forensic Evidence (Claim 13)

2.2 Why This Matters

- **Legal Polish:** A claim with mixed grammar looks unfinished and prone to ambiguity (is "providing" a step to be taken, or a description of the result?).
- **Article 84 EPC:** The lack of clarity in the drafting style can trigger objections regarding the "conciseness" and "clarity" of the claims.

Source (English)	NMT Output (Oscillation)	Golden Rewrite (Consistent)
Step (iii1): "...determining a base value..."	× "...déterminer une valeur..." (Infinitive)	"...la détermination d'une valeur..." (Noun)
Step (iii2): "...selecting prescription data..."	"...sélection de données..." (Noun)	"...la sélection de données..." (Noun)
Step (iii3): "...providing said subseries..."	× "...fournir ladite sous-série..." (Infinitive)	"...la fourniture de ladite..." (Noun)

[cite$_s$*tart*]

Table 1: Morphological Oscillation in Claim 13

- **Machine Signature:** This oscillation is a hallmark of machine translation, potentially alerting examiners to scrutinize the text more aggressively.

3 Alignment Methodology

3.1 Vertical Context Awareness

To cure "Oscillation," our alignment protocol treats the entire claim list as a single structural object, not separate sentences.

Alignment Methodology

Constraint Propagation Protocol:

1. **Anchor Detection:** Identify the grammatical form of the first list item (e.g., Noun).
2. **Format Locking:** Apply a `FORCE_POS_TAG = NOUN` constraint to all subsequent siblings in the list hierarchy (iii1, iii2, iii3...).
3. **Infinitive Penalty:** During RLHF, the model receives a negative reward if it switches back to an Infinitive form after correctly generating a Noun in the previous step.

4 Key Insights

Key Concept

What This Case Study Demonstrates:

1. **Consistency > Local Fluency:** Even if "Fournir" (Provide) is a valid translation of the word, it is an invalid translation of the *structure*.
2. **The "Goldfish Memory" of AI:** Generic models often forget the grammatical rule they applied just one line earlier. Alignment forces them to remember.
3. **Professionalism as a Constraint:** We define "Professional Style" not as a vague vibe, but as a rigid set of binary constraints (Parallelism = True).

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