



NEURAL MACHINE TRANSLATION VS. PROFESSIONAL HUMAN  
TRANSLATION: A COMPARATIVE ANALYSIS OF SEMANTIC ACCURACY  
AND PRAGMATIC EQUIVALENCE

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**Abstract:** *The rapid evolution of Neural Machine Translation (NMT) has fundamentally altered the landscape of cross-linguistic communication. However, the chasm between "fluent" machine output and "accurate" human translation remains a critical area of linguistic inquiry. This paper investigates the semantic precision of NMT systems compared to professional human translation. Through a qualitative and quantitative analysis of polysemy, idiomaticity, and contextual cohesion, the study identifies the cognitive limitations of transformer-based models. The findings suggest that while NMT excels in lexical speed, it consistently fails in "deep semantics"—the ability to decode intent and cultural subtext.*

**Keywords:** *Neural Machine Translation (NMT), Semantic Accuracy, Polysemy, Pragmatic Equivalence, Transformer Models, Translation Studies, MTPE.*

### **Introduction**

The transition from Statistical Machine Translation (SMT) to Neural Machine Translation (NMT) in the mid-2010s marked a paradigm shift in computational linguistics. By utilizing deep learning and "attention mechanisms," NMT systems began producing translations that mimicked human fluency. However, in professional translation, fluency is often a "veneer" that can mask significant semantic deviations.

The core problem lies in the distinction between Signification (the literal meaning of words) and Sense (the intended meaning within a specific context). Professional translation is not a substitution of strings but an act of cognitive re-encoding based on Skopos Theory—the principle that the target text's function determines the translation strategy. This article seeks to dissect the "semantic vacuum" inherent in NMT and contrast it with the holistic approach of professional linguists.

### **Methodology**

To assess the divergence in semantic accuracy, a Triangulation Research Design was employed:

**Corpus Selection:** A diverse corpus of 500 segments was selected, ranging from technical manuals (informative) to legal contracts (operative) and literary excerpts (expressive).





## TANQIDIY NAZAR, TAHLILIY TAFAKKUR VA INNOVATSION G'OYALAR



**Comparative Analysis:** Outputs from top-tier NMT engines (Google Translate and DeepL) were benchmarked against "Gold Standard" translations produced by certified professional translators with over 10 years of experience.

**Error Typology:** Errors were categorized using the MQM (Multidimensional Quality Metrics) framework, focusing specifically on:

**Lexical Ambiguity:** Misinterpretation of polysemous words.

**Contextual Cohesion:** Failure to maintain reference across sentence boundaries.

**Cultural Pragmatics:** Literal translation of non-compositional units (idioms).

**Results: The Semantic Gap**

### 1. Lexical Ambiguity and the Polysemy Trap

NMT systems operate on Vector Space Semantics, where words are represented as numerical coordinates (Word Embeddings). While effective for common associations, this method struggles with "low-frequency senses" of high-frequency words.

**The Statistical Bias:** NMT models are biased toward the most frequent sense found in their training data.

**Example (Legal Context):** The word "Consideration".

**General Context:** "Thoughtful regard."

**Legal Context:** "A counterparty's payment or value in a contract."

**NMT Result:** Frequently translates it as "thought" or "reflection" in Uzbek (mulohaza), rendering a legal contract void of its primary meaning.

**Professional Translation:** Corrects this to "tovon" or "haq" (legal consideration).

### 2. Idiomaticity and Cultural Equivalence

Idioms are Non-compositional Units; their meaning cannot be derived from the sum of their parts. NMT, despite its "attention" layers, often falls into the trap of Compositional Logic.

Feature	NMT Performance	Professional Translation
speed	Near-instantaneous	Slow/Methodological
Terminology	Consistent(with glossaries)	Highly accurate and researched
Contextual Flow	Limited to specific segments	Holistic (entire document)

As illustrated, the NMT lacks a "Cultural Filter." It treats language as a closed mathematical system rather than a living, social construct.

### Discussion

#### The "Hallucination" Phenomenon

A significant finding in this study is the Hallucination effect in NMT. Because NMT prioritizes Probability over Truth, it may generate a sentence that is grammatically perfect but semantically unrelated to the source. A professional translator possesses an Ethical Compass





and Cognitive Verification—if a sentence makes no sense, the human investigates. The machine simply "predicts" the next most likely word.

Discourse Cohesion (Anaphora Resolution)

Professional translators look at the "Macro-text." They ensure that a pronoun in Paragraph 10 correctly refers to a noun in Paragraph 1. NMT, which often processes text in segments or "windows," frequently loses this thread.

Semantic Accuracy=f(Content +Intent+Culture)

The formula above illustrates that accuracy is a function of three variables. NMT excels at Context (local) but is virtually blind to Intent and Culture.

The Future: MTPE (Post-Editing)

The results indicate that NMT is a Productivity Tool, not a Replacement. The emerging industry standard is Machine Translation Post-Editing (MTPE). In this workflow:

NMT provides the "Skeleton" (Syntactic structure).

Professional Translator provides the "Soul" (Semantic precision and stylistic nuance).

Conclusion

The comparative analysis proves that Semantic Accuracy is an interpretive, not a calculative, process. \* NMT is superior in speed and the handling of repetitive, high-volume technical data where language is standardized.

Professional Translation remains the only reliable method for high-stakes communication (Legal, Medical, Literary) where a single semantic error can lead to litigation, medical failure, or loss of aesthetic value.

While NMT has mastered the Syntax of language, the Semantics—the ghost in the machine—remains a uniquely human domain. Future AI development must move beyond statistical prediction toward Cognitive AI to bridge this final gap.

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