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| RESEARCH ARTICLE

Translation of English and Arabic "Sleep" Terms and Formulaic Expressions by Artificial Intelligence: A Comparison of Copilot and DeepSeek

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| ABSTRACT

This study examined how Microsoft Copilot (MC) and DeepSeek (DS) translate sleep terms vs formulaic expressions from English to Arabic and Arabic to English, compared MC and DS's translations, identified the percentage of accurate equivalents, types of errors made, the translation strategies used, and AI translation error causes. Analysis of 130 English sleep terms, 91 English sleep formulaic expressions and 110 Arabic terms and formulaic expressions revealed that MC and DS rendered 91% correct equivalents to English sleep idioms, 79% and 71.5% correct equivalents to English formulaic expressions respectively as She wept herself to sleep بكت حتى نامت, and 48% and 49% of the Arabic terms and formulaic expressions respectively as نوم قلق restless sleep. The most common translation strategy was literal, word for word translation as غرق في النّوم He drowned in sleep, instead of he is fast asleep); نمت كالقتيلة I slept like the dead instead of slept like a log. DS gave an explanation or annotation following the equivalent in 14% and MC in 3% of the Arabic items as in طار النّومُ من عينيه Sleep flew from his eyes (couldn't sleep). The tendency to Arabic sleep items literally based on surface meaning because is due to an AI default literal translation strategy. AI systems tend to flatten nuance. Higher percentages of correct equivalents to English sleep items were given in this study than medical terms, zero-expressions, expressions of impossibility, Gaza-Israel War terminology, Arabic grammatical terms used metaphorically, Abu & Umm medical folk terms, Abu brand names and Abu & Umm metonymic animal and plant folk names. English-Arabic translation was easier than Arabic-English translation due to training bias, as most AI models are trained on English-dominant corpora, with English-Arabic translation receiving more attention and refinement than Arabic-English translation. Additionally, Arabic-English translation is less represented in the AI corpora, especially for domain-specific or idiomatic content, leading to lower performance. The study gives recommendations for enhancing Arabic idiom recognition and disambiguation by AI models, adding Arabic dictionaries, such as Almaany Dictionaries, to the AI corpora and for translators to make the best use of AI in translation.

| KEYWORDS

Copilot translation, DeepSeek translation, AI translation, sleep terms, sleep idioms, English-Arabic translation, Arabic-English translation, literal translation, AI translation strategies, AI translation errors

| ARTICLE INFORMATION

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1. Introduction

As a noun, sleep[1] in English has several meanings. It is a normal process that allows the body and brain to rest. It refers to the natural absence of wakefulness, loss of consciousness of one's surroundings, a state resembling sleep such as torpid inactivity, death *(put a pet dog to sleep),* trance, coma, the closing of petals or leaves especially at night, a diminution of feeling followed by tingling *(my foot has gone to sleep),* dormancy *(a sleeping volcano),* animal hibernation and a period spent sleeping. As an

[1] SLEEP Definition & Meaning - Merriam-Webster

Intransitive Verb, *sleep* refers to rest in a state of sleep, to be in a state of quiescence or death resembling sleep. As a Transitive Verb, *sleep* means to be slumbering in (*slept like a log*), to get rid of, or spend in by sleep (*sleep away the hours*; *sleep off a headache*) and to provide sleeping accommodations for somebody (*the room sleeps six*). There are several derived adjectives and nouns as *sleepy*, *sleeplike,* and *sleepless (Adj)*, "*sleeper*" referring to a person, *sleepiness* and "*sleeplessness*" referring to the state. Metaphorically, *sleep* is used as a euphemism for death and in idiomatic expressions as **"***let sleeping dogs lie" (avoid stirring up old conflicts); "lose sleep over" (worry intensely); "sleep tight" (sleep well); "sleep on it" (delay a decision until after rest); "put to sleep" (euthanize (especially animals)* and others.

In Arabic, the root [2]نام /na:ma/ "sleep" encompasses a rich semantic field centered around sleep, rest, and stillness, and extensions into metaphorical and idiomatic usage. The verb نامَ /na:ma/ means "to sleep," "to lie down," or "to recline." It can also mean "to die," as in نامَ نومته الأبدية /na:ma nawmatahu alʔabadiyyah/ "*he slept his eternal sleep*." When used in expressions like نامَ إلى /na:ma ʔila:/, it conveys "*to find peace or reassurance with someone*," while نامَ عن /na:ma ʕan/ implies "*to neglect or be heedless of something*." The form نامَ لـ /na:ma li/ may indicate "*to humble oneself before God*."

In nature and metaphor, the verb takes on broader meanings: نامت الريح /na:mat arri:ħ/ "*the wind slept*" means "*the wind calmed*"; نام البحر */na:ma albaħr/* "*the sea slept*" means "the sea became tranquil"; and نامت النار */na:mat anna:r/* "*the fire slept*" means "the fire died down or lost its heat." Similarly, نام العرق /na:ma alʕirq/ "the vein slept" means "the pulse stopped," and نامت السوق /na:mat assu:q/ "*the market slept*" means "*the market stagnated*." Even inanimate objects are described with this verb: نام الثوب /na:ma aθθawb/ "*the garment slept*" means "the garment wore out," and نام الخلخال /na:ma alxalxa:l/ "*the anklet slept*" means "*its sound ceased due to the swelling of the leg.*"

The noun [3]نَوْم /nawm/ is the verbal noun of نامَ /na:ma/, and it gives rise to several derivatives. نَائِم /na:ʔim/ "sleeper" is the active participle, with plural forms نائمون /na:ʔimu:n/, نُوَّام /nuwwa:m/, نُوَّم /nuwwam/, and نِيَام /nija:m/; the feminine is نائمة /na:ʔima/, with plurals نائمات /na:ʔima:t/, نُوَّم /nuwwa:m/, and نِيَام /nija:m/. The phrase كان الناس نِيَاماً /ka:na anna:s nija:man/ means "*the people were asleep.*" Related expressions include أحلام نائم /ʔaħla:m na:ʔim/ "*dreams of a sleeper,*" meaning "*false hopes*"; ليل نائم /lajl na:ʔim/ "*sleeping night,*" meaning "*a night for sleeping*"; and نائم في العسل /na:ʔim fi: alʕasal/ "*sleeping in honey,*" meaning "*utterly oblivious.*" The verb نَوَّمَ /naw:ama/ "*to put to sleep*" is the causative form, meaning "*to induce sleep.*" For example, نوَّمَ الدواءُ الصبيَّ /naw:ama addawaːʔu aṣṣabijja/ "*the medicine put the boy to sleep,*" and نوَّمَ المريضَ /naw:ama almari:ðа/ "*he anesthetized the patient.*" نوَّمَهُ تنويماً مغناطيسياً /naw:amahu tanwi:man maɣna:ṭi:sijjan/ means "*he hypnotized him.*" The agent noun is مُنوِّم /munaw:im/ "*sleep-inducer,*" and the passive participle is مُنوَّم /munaw:am/ "*one who is put to sleep.*" Interestingly, نوَّمتِ الإبلُ /naw:amati alʔibilu/ "*the camels slept*" metaphorically means "*the camels died.*" The reflexive form تَنَاوَمَ /tana:wama/ "*to feign sleep*" adds nuance: تَنَاوَمَ الولدُ /tana:wama alwaladu/ "*the boy pretended to sleep,*" and تَنَاوَمَ إليه /tana:wama ʔilajhi/ "*he found peace with him.*" The comparative expression في المناومة /fi: almuna:wama/ means "*he was sleepier than him.*" From this root also comes مَنَام /mana:m/ "*sleep or dream,*" which can mean both "*a dream*" and "*a place of sleep.*" The plural is منامات /mana:ma:t/ "*dreams*" and مناوم /mana:wim/ "*sleeping places.*" مُنَام /muna:m/ is the passive participle of أَنامَ /ʔana:ma/ "*to cause to sleep.*"

Due to the extensive use of technical terms, idioms, collocations and metaphors in general and specialized contexts, a review of the literature revealed a plethora of studies on the utilization of AI in translation such as the translation strategies and lexical features of metaphorical terms in German AI discourse (Siyu, 2025); how AI systems struggle with culturally specific idioms (Azizov, 2024); metaphor translation by AI into English (Wang & Chai, 2024); challenges that face machine translation (MT) in translating metaphorical expressions (Matyakubova, 2024); interpreting novel literary metaphors by human translators and GPT-4 (Ichien, Stamenković & Holyoak, 2024); cultural perspectives on the translation system of political text metaphors using AI (He & Jiang, 2024); metaphorical language interpretation as a challenge to AI (Skrynnikova, 2024); corpus and metrics for evaluating the quality of MT translation of metaphorical language (Wang, Zhang, Wu, Loakman, Huang & Lin, 2024); literary metaphor in the context of generative AI (van Heerden & Bas, 2024); AI through the lens of metaphor in the light of the European Union Artificial Intelligence Act (Ye & Li, 2024); can Google Translate (GT) catch the meaning of metaphors (Zajdel, 2022); AI and metaphors (Veale, Shutova & Klebanov, 2016); why metaphor and AI matter to each other (Barnden, 2008) and others.

Another group of studies focused on AI translation of proverbs, euphemisms, idioms and metaphors in Arabic such as comparing Chat GPT and human translators in translating proverbs from English to Arabic (El-Saadany, 2024); assessment of the quality of human vs. AI Arabic-English translations of hidden proverbs in the Holy Qur'ān (Fakhrabadi & Sharifabad, 2023); comparison of Arabic and English proverb translation for intercultural interaction by AI (Hamdi, Hashem, Holbah, Azi & Mohammed, 2023); and

[2] https://www.almaany.com/ar/dict/ar-ar/%D9%86%D8%A7%D9%85/
[3] https://www.almaany.com/ar/dict/ar-ar/%D9%86%D9%88%D9%85/

comparison of the translation accuracy of English and Arabic proverbs by Reverso, Systran, Yandex, Bing and Google Translate (Jibreel, 2023) and others.

Further studies focused on the detection of Arabic idioms by Deep Learning and Transformer-based models (Himdi, 2024); a corpus-based study of idiom translation by AI (Mughal, Seemab, Zaigham, Bhatti & Khan, 2024); translation strategies used by AI models and human translators in translating euphemistic expressions from Arabic to English (Al-Wasy & Mohammed, 2024); the impact of prompt formulation in AI Chatbots and the translation of idioms from English to Arabic and Arabic to English (Hakami & Abomoati, 2024); problems of translating English food idioms into Arabic by ChatGPT with solutions (Hamoud, 2024); analyzing the performance of Gemini, ChatGPT, and Google Translate in rendering English idioms into Arabic (Obeidat, Haider, Tair & Sahari, 2024); translation evaluation of three MT systems, with special reference to idiomatic expressions (Musaad & Al Towity, 2023); the semantic and contextual challenges that AI has in translating idiomatic expressions (Almaaytah, 2022); a conceptual approach to natural language processing of Arabic metaphors (Alkhatib & Shaalan, 2017); and paraphrasing Arabic metaphors by neural MT systems (Alkhatib & Shaalan, 2018) and others.

Additionally, numerous studies were conducted by the author on the translation of specialized terms and specific metaphorical expressions in several domains using AI as translation of denotative and metonymic abu- and umm-animal and plant folk names in Arabic by MC and DS's (Al-Jarf, 2025e); the translation of Arabic Abu-brand names by MC and DS based on different prompts (Al-Jarf, 2025d); the translation of Arabic folk medical terms with om and Abu by MC and DS (Al-Jarf, 2025h); a comparative linguistic study of MC and GT in translating medical terms (Al-Jarf, 2024); DS, GT and MC's translation of Arabic grammatical terms used metaphorically (Al-Jarf, 2025f); a comparative study of MC and student-translators in translating Arabic expressions of impossibility (Al-Jarf, 2025f); translation of zero-expressions by MC and GT (Al-Jarf, 2025i); translation of the Gaza-Israel war terminology by MC and Google Translate (GT) (Al-Jarf, 2025c); translation of educational polysemes in full-text Arabic research articles by GT (Al-Jarf, 2025a); English-Arabic translation of technical terms by GT (Al-Jarf, 2021 & Al-Jarf, 2016); and Arabic transliteration of borrowed English nouns with /g/ by MC and DS (Al-Jarf, 2025b).

The literature review indicated that broader research on AI metaphor translation (e.g., neural machine translation and large language models) shows difficulty with idioms, in general, due to cultural opacity and nonliteral meaning. No major studies have yet focused on how AI translates sleep-related terms, idioms and metaphorical expressions across languages. Therefore, this study aims to explore how AI translates sleep terms vs sleep formulaic expressions. It aims to compare Microsoft Copilot (MC) and DeepSeek's (DS) translation, percentage of accurate equivalents rendered by both, types of errors made, translation strategies used, AI translation error causes, and to give recommendations for AI designers and translation students. It also aims to find out whether AI can identify the types of sleep phrases given, which are easier to translate into English sleep terms or formulaic expressions, which are easier for AI tools to perform English-Arabic or Arabic-English translation, why AI gives literal translations, why AI does not give multiple equivalents for polysemes and whether AI benefits from experience with users.

There is a noticeable gap in the literature in comparative studies of "sleep" idioms across languages (e.g., English vs. Arabic), human translation strategies for metaphorical "sleep" expressions, error analysis of idiom translation in professional or student contexts and cultural connotation mapping sleep-related metaphors. This study fills a rare and valuable gap in the AI translation research. The comparison of MC and DS's translation of sleep idioms and formulaic expressions is one of the first empirical benchmarks in this niche. This study stands out because it targets a specific semantic field (sleep). It compares the translation performance of two salient AI models. It focuses on Arabic-English idioms, which are underrepresented in metaphor translation literature. It offers pedagogical implications for both human translators and translation students and AI training models regarding domain-specific metaphor translation by AI, a field that is just beginning to take shape. The targeted approach, in the current study, is rare and valuable. With its classification system, performance metrics, and bilingual corpus, this study fills this gap with scholarly rigor. This study could serve as a foundational reference in domain-specific metaphor translation, especially in medical, psychological, or cultural contexts where 'sleep" terminology carries layered meaning.

Moreover, this study is part of a series of studies by the author on the translation of a variety of specialized terms, metaphorical and idiomatic expressions, by different AI models, which were mentioned above.

2. Definition of Terms

DeepSeek[4] is a Chinese AI research company that was founded in 2023 and has since released several AI models, including DeepSeekV3 and R1, which are available for users for free. DS provides open-source LLMs that operate using advanced neural networks and machine learning algorithms to power its language processing capabilities. Its open-weight philosophy, cost-

[4] DeepSeek AI

efficiency, and rapid innovation have positioned DeepSeek as a disruptive force in the global AI landscape, challenging dominant players like OpenAI and Meta. DS algorithms enable its models to adapt, process, and generate text with high accuracy and efficiency. Its neural systems are designed to enhance text understanding, generation, real-time processing and decision-making, making DeepSeek's systems offer a scalable and high-performance alternative that appeals to businesses and developers, and researchers.

Microsoft Copilot[5] is an AI-powered assistant developed by Microsoft, built on large language model (LLM) technology and enhanced by the Prometheus framework. It was originally launched as Bing Chat on February 7, 2023. Since then, it has evolved into Microsoft Copilot, expanding across platforms, including Edge, and mobile. It serves as Microsoft's primary successor to Cortana, offering a more advanced and versatile interface that resembles tools like ChatGPT, but with deeper integration into Microsoft's ecosystem. It is a general-purpose conversational AI designed to assist users with writing, research, translation, image analysis, and workflow optimization and allows users to analyze and interpret images and documents, generate creative visuals and engage in spoken dialogue and visual analysis. Today, Copilot is embedded in Windows 11 and Microsoft 365, where it assists with tasks such as summarizing, drafting documents, and analyzing spreadsheets.

3. Methodology

A corpus of 331 English and Arabic sleep terms, idioms, metaphorical expressions and collocations was collected from Almaany Online Dictionaries and the author's own collection. The corpus consisted of:

1) **130 English sleep terms** which include:
frozen sleep, sleep mode, dreaming sleep, Less refreshing sleep, sleep apnea, Sleep arousal disorder, Sleep buster, Sleep grand mal, synchronized sleep, twilight anaesthesia, twilight sleep, yen sleep, Crescendo sleep, sleep Military, continuous sleep treatment, Deprivation sleep, electrotherapeutic sleep, Improved sleep, sleep drunkenness, Sleep restriction, Sleep-terror disorder, sleep therapy, Sleep troubles, sleep-inducing, active sleep (= REM sleep), Dental sleep medicine, electro-sleep, hybrid sleep, Narcolepsy (paroxysmal sleep), Orthodox sleep, Sleep disease, sleep-inducing, Sleep pattern disturbance, Sleep-related seizure disorder, adjustment sleep disorder, Aging and sleep, Alzheimer's sleep problems, beauty sleep, cause to sleep, Central sleep apnea, Complex sleep apnea, dead sleep, Deep sleep = NREM sleep, delayed sleep-phase syndrome, delta wave sleep, desynchronized sleep, Disrupts sleep, dog sleep, electric sleep, fast wave sleep, General sleep disturbances, General sleep information, Healthy Sleep, hypnotic sleep, Impaired sleep, Improve Memory or Sleep, Improve sleep, Interrupted sleep, Irregular sleep schedule, Memory and Sleep Healthcare Products, night palsy (=sleep paralysis), Nighttime sleep problems, non–rapid eye movement, Nonorganic sleep disorders, NREM sleep, Obstructive Sleep Apnea, OTC sleep aids, paradoxical sleep, paroxysmal sleep, pediatric sleep apnea, Poor sleep, Poor sleep habits, Poor sleep patterns, Previous sleep deprivation, Deprivation of sleep, prolonged sleep, REM sleep, Restless sleep, Semi-narcosis = twilight sleep, Severe sleep apnea, Sleep alterations, Sleep changes, Sleep deprivation, sleep disorder, Sleep Disorders Center, Sleep disorders research, Sleep disruption, Sleep disturbance, Sleep drive, Sleep environment improvement, sleep epilepsy, Sleep Evaluation, Sleep guidelines, Sleep Helper, sleep history questionnaire, Sleep inertia, sleep learning, Sleep medications, Sleep Medicine Center, Sleep medicine research, Sleep Medicine Specialist, Sleep movement, sleep over, Sleep paralysis, Sleep problems, Sleep quality, Sleep records, Sleep-related breathing disorder, Sleep-related eating disorder, Sleep-related hypoventilation disorders, Sleep research, sleep research laboratory, Sleep rhythm, Sleep Shorts, sleep spindle, Sleep stages, Sleep strategies, Sleep study, Sleep talking, Sleep tips, Sleep-wake cycle disturbances, sleep-wake rhythm, sleep walking, sleepless, insomniac, awake, unable to sleep, slow wave sleep (=NREM sleep), Stages of Normal Sleep, troubled sleep, unrefreshing sleep, waking paralysis, winter sleep.

2) **91 English sleep idioms, metaphors & collocations** that include the following:
sleep (lightly), Drift into sleep (someone), Drift off to sleep (someone), Eat little, sleep better, last sleep, lay to sleep or rest (v), make sleep, Pass over in one's sleep, rob someone's sleep, sink (into sleep), sleep on, Sleep on a decision (someone), Sleep the night, slept on it, put to sleep, Sleep like a log, A sleep at the switch, couldn't sleep, Fall into a deep sleep, Go to sleep (one's leg), Not get a wink of sleep, not sleep a wink, send somebody to sleep, sleep away, Sleep over a headache (someone), to deprive of sleep, dead sleep, sleep the sleep of the just, depend on pills to sleep, find no sleep (v), Ache for sleep (someone), be lulled to sleep, Better sleep, Can do it in his sleep, cat-sleep, Child sleep, could not sleep; can not sleep, cry oneself to sleep, deprive of sleep, Die in one's sleep, doze; light sleep, dying in one's sleep, eternal sleep, Go to sleep (someone), Have a good night's sleep, Have one's sleep out, I could not get to sleep, in his sleep, Lack of sleep, light sleep, lost sleep over, lull a baby to sleep, Occur during sleep, Pass away peacefully in one's sleep, Pass on in one's sleep, place to sleep; bed; bedroom; dormitory, quiet sleep, Ramble in one's sleep, read to sleep, rock to sleep, She wept herself to sleep, sleep around, sleep deeply, be sound asleep, sleep in, Sleep in at the weekends (someone), Sleep late, sleep like a baby, Sleep like a top, sleep off, Sleep off a

[5] https://copilot.microsoft.com

headache, Sleep off one's hangover, Sleep on into the afternoon (someone), Sleep on it, sleep one's life away, sleep out, Sleep out under the stars (someone), Sleep rough (thousands of kids), Sleep securely on both ears (someone), sleep soundly, Sleep straight through the noise (someone), Sleep the morning away (someone), Sleep the night with one's friend, sleep tight, sleep with one eye open, slept well, brief sleep, snatch of sleep, Sob oneself to sleep, fast asleep, sound sleep, winter sleep hibernation.

3) **110 Arabic, terms, idioms and collocations** that include the following:
أثقله النّوم، أَخَذَهُ النَّوْمُ، استثقل في النّوم، استنهض نائما، أنامَتْ السَّنَةُ الناسَ، تَنَوَّمَ، طار النَّومُ من عينيه، غلبه النوم، غَلَبَه في المناومَةَ، في سابع نومة، لَيْلٌ نائم، ما نامت السماءُ اللَّيلَةَ مَطَراً أو بَرْقاً، المَنامَةُ، نام عن حاجته، نامَ الثوبُ، نام الخَلْخَالُ، نامَ الرجُلُ، نَامَ الرَّجُلُ نَوْمَتَهُ الأَبَدِيَّةُ، نامَ العِرْقُ، نَامَ إِليه، نَامَ عَنْ حَاجَتِهِ، نَامَ فلانٌ للّه، نامَ هَمُّهُ، نامتْ الشاةُ، نَامَتْ حَرَكَةُ السُّوقِ، ناوَمَنِي فَنُمْتُه، نائم في العسل، النائِمَةُ، نبّه نائما من نومه، نمت كالقتيلة، نوم العوافي، نوم الغزلان، نَوَّمَ القَوْمُ، نَوَّمَ الْمَرِيضَ، نومة أهل الكهف، النَّوم سلطان، النَّوْم في العسل، يأخُذُه نوامٌ، نوما هنيئا، ما فيني نوم، النوم السامع، نام على جنب واحد، نوم الهنا، أصحى النّائم، ضرب النَّوم على أذنه، غرق في النّوم، يستغرق في النَّوم، غط في نوم عميق، جافاني النوم، أفاق من نومته، نوم الظالم عبادة، النوم سلطان، استفاق من نومته، فوّق النّائم، نَامَ الشيءُ، نام نومته الأخيرة، نامت السّوقُ، غطّ النّائم، أنهض نائما، ذاد النّوم عن عينيه، مُسْتَغْرِقاً فِي النَّوْمِ، نام ملءَ عينيه، يا نَوْمانُ، نَامَتِ النَّارُ، فرّع فلانا من النوم، أفزع فلانا من النّوم، أنامَ فُلاناً، حلم ابليس في الجنة، خنفر النّائم في نومه، وضعية النوم، الرقاد، بين النوم واليقظة، نوم سليم، أحلام نائم، أنامَهُ، خرخر النّائم، رأى في منامه، عربة النَّوم، غُرْفَةُ النَّوْمِ، قميص النّوم، كيس النَّوم، لاَ تَأْخُذُهُ سِنَةٌ وَلاَ نَوْمٌ، لا نامت اعين الجبناء، لِبَاسُ النَّوْمِ، مرض النّوم، نام البحرُ، نام في العراء، نَامَ نَوْماً عَمِيقاً، نامَت الرِّيحُ، نَوَّمَتْ وَلِيدَهَا، نَوَّمَهُ تَنْوِيماً مِغْنَاطِيسِيّاً، وقت النَّوم، اليوم العالمي للنوم، طريقة النوم العسكرية، قلة النوم، أذكار النوم، اضطرابات النوم، أنماط النوم، نوم صحي، نوم مريح، نوم قلق، سوء النوم، كمية النوم، مقاومة الرغبة في النوم، درجات النوم، انقطاع النفس اثناء النوم، نومة الصبح تورّث الفقر، من زان نومه زان يومه، اضطراب فرط النوم، نوم صحي.

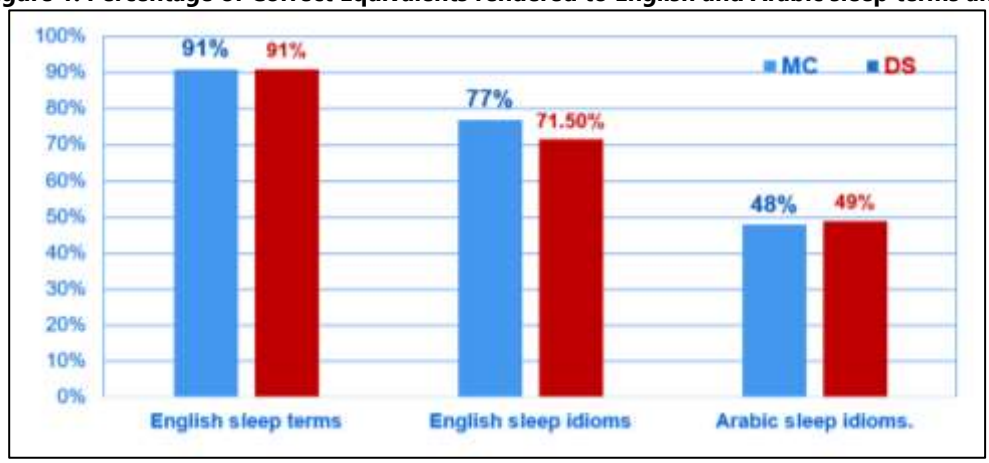
The English and Arabic sleep terms, idiom, metaphorical expressions and collocations in the sample are used in a variety of fields as medicine, psychology, technology, biology, agriculture and so on. The 3 sets of "sleep" items were translated by Microsoft Copilot (MC) & DeepSeek (DS) in isolation, i.e., the items were presented as a list a list of phrases, not in a connected text. The prompt did not provide their context or domain, and did not mention the type of phrases as to whether they are technical term, idioms, collocations, metaphors and the like. MC and DS were asked to give all possible equivalents to English and Arabic sleep phrases. All equivalents had to be rendered in Modern Standard Arabic, avoiding dialectal variations. Each prompt specified how the equivalent and the source phrase should be organized in the output, i.e., putting the equivalent next to the source phrase to avoid confusion and make comparisons easy.

For each set, the total correct translation equivalents given by both MC & DS were calculated. The strategies used by MC and DS in translating each term and formulaic expression were classified into literal, partial, and conceptual translation. Percentages of correct and faulty responses were calculated for MC and DS separately. Results of the data analysis are reported quantitatively and qualitatively.

For reliability and validity purposes, two colleagues specialized in translation and linguistics classified a sample of errors reflecting semantic, contextual, syntactic and lexical weaknesses. They went through the list of terms and formulaic expressions in the sample and their equivalents and made judgments regarding the accuracy and classification of the translation equivalents. Classifications by all three evaluators were compared. There was a 97% agreement between the evaluators. Disagreements were solved by discussion.

4. Results

Figure 1: Percentage of Correct Equivalents rendered to English and Arabic sleep terms and idioms by MC and



4.1 Translation of English sleep terminology

Results of the percentages of correctly translated English sleep terms and formulaic expressions by MC and DS are shown in Figure 1 which shows that 91% of the English terms in the sample were correctly translated by both MC and DS as in the following examples:

- *Sleep-related seizure disorder* اضطراب النوبات المرتبط بالنوم.
- *Central sleep apnea* انقطاع النفس المركزي أثناء النوم
- *Desynchronized sleep* النوم غير المتزامن
- *Fast wave sleep* نوم الموجات السريعة
- *NREM sleep* نوم حركة العين غير السريعة
- *Paroxysmal sleep* النوم النوباتي
- *Sleep buster* مثبط النوم /كاسر النوم
- *Sleep paralysis* شلل النوم
- *Sleep rhythm* إيقاع النوم
- *Continuous sleep treatment* علاج النوم المستمر

Examples of faulty translations of English sleep terminology rendered by both MC and DS are:

- *Sleep therapy* علاج النوم *instead of* العلاج بالنوم.
- *Electrotherapeutic sleep* النوم العلاجي الكهربائي *instead of* النوم بالعلاج الكهربائي.
- *Electro-sleep* النوم الكهربي.
- *Sleep mode* وضع النوم *(in computers) instead of* نمط النوم.
- *Sleep terror disorder* اضطراب الرعب الليلي *instead of* اضطراب الرعب من النوم.
- *Sleep drunkenness* سُكر النوم /ترنح النوم *instead of* .
- *Frozen sleep* النوم المجمد /النوم المتجمد *instead of* النوم بالتجمد.

4.2 Translation of English sleep formulaic expressions

Data analysis revealed that 77% of the English terms in the sample were correctly translated by MC compared to 71.5% by DS as in the following examples:

- *Rock to sleep* يهدهد للنوم
- *Send somebody to sleep* يجعل شخصاً ينام
- *She wept herself to sleep* بكت حتى نامت
- *Read to sleep* يقرأ حتى ينام
- *Go to sleep (someone)* يذهب للنوم
- *Go to sleep (one's leg)* تنمل الساق / خدر الساق
- *Cry oneself to sleep* يبكي حتى ينام
- *Not get a wink of sleep* لم يغمض له جفن
- *Ramble in one's sleep* يهذي أثناء النوم
- *Cat-sleep* نوم القطة / نوم خفيف

Examples of faulty equivalents of English sleep idioms rendered by both MC and DS are:

- *Slept on it* فكّر فيه بعد النوم
- *Last sleep* النوم الأخير / الموت
- *Rob someone's sleep* يسرق نوم شخص / يحرمه من النوم
- *Sink (into sleep)* يغوص في النوم
- *Sleep on* ينام عليه / يؤجل القرار للنوم عليه
- *Sleep on a decision (someone)* ينام قبل اتخاذ القرار
- *Sleep the night* ينام الليل
- *Sleep the sleep of the just* ينام نوم العادلين
- *Find no sleep (v)* لا يجد النوم
- *Drift into sleep (someone)* ينجرف إلى النوم

4.3 Translation of Arabic Sleep terms and formulaic expressions

Data analysis revealed that 48% of the English terms in the sample were correctly translated by both MC and 49% by DS as in the following examples:

- لا تَأْخُذُهُ سِنَةٌ وَلاَ نَوْمٌ *neither drowsiness nor sleep overtakes him*
- أذكار النوم *sleep supplications*
- لا نامت اعين الجبناء *may the eyes of cowards never sleep*
- انقطاع النفس اثناء النوم *sleep apnea*
- لِبَاسُ النَّوْمِ *sleepwear*
- مرض النّوم *sleeping sickness*
- مُسْتَغْرِق فِي النَّوْمِ *deeply asleep*
- نام ملءَ عينيه *he slept soundly*
- نَامَ نَوْماً عَمِيقاً *he slept deeply*
- درجات النوم *stages of sleep*
- نامَت الرّيحُ *the wind calmed*
- نَوَّمَتْ وَلِيدَهَا *she put her baby to sleep*
- نام البحرُ *the sea became calm*
- نام في العراء *he slept in the open*
- نَوَّمَهُ تَنْوِيماً مِغْنَاطِيسِيّاً *he hypnotized him*
- نوم مريح *comfortable sleep*
- نوم قلق *restless sleep*
- سوء النوم *poor sleep*
- كمية النوم *amount of sleep*
- مقاومة الرغبة في النوم *resisting the urge to sleep*
- اضطرابات النوم *sleep disorders*

Examples of faulty equivalents of Arabic sleep terms and idioms rendered by both MC and DS are:

- نومة الغزلان *light, alert sleep.*
- في سابع نومة *in the seventh sleep (very deep sleep).*
- النوم سلطان *sleep is a sovereign.*
- نمت كالقتيلة *I slept like the dead.*
- نائم في العسل *sleep in honey (deep or oblivious sleep).*
- ضرب النَّوم على أذنه *sleep overcame his hearing.*
- نوم العوافي *sleep well.*
- يستغرق في النَّوم *he sinks into sleep.*
- أثقله النّوم *sleep weighed him down.*
- أَخَذَهُ النَّوْمُ *sleep overtook him.*
- استفاق من نومته *he awoke from his sleep.*
- طار النَّومُ من عينيه *sleep flew from his eyes.*
- جافاني النوم *sleep deserted me.*
- غرق في النّوم *he drowned in sleep.*
- غط في نوم عميق *he plunged into deep sleep.*

4.4 Translation strategies used by MC and DS

MC & DS tended to translate Arabic items literally based on the surface meaning. They had difficulty matching an Arabic structure with English (word order).

- استفاق من نومته He awoke from his sleep by MC & He awoke from his sleep by DS instead of woke up.
- جافاني النوم Sleep deserted me by MC & Sleep avoided me by DS instead of I could not sleep.
- ضرب النَّوم على أذنه Sleep overcame his hearing by MC & Sleep struck his ear (fell asleep) by DS instead a cover of sleep was cast over his ears.
- طار النَّومُ من عينيه Sleep flew from his eyes by MC & Sleep flew from his eyes (couldn't sleep) by DS instead of can no longer sleep.
- غرق في النّوم He drowned in sleep by MC غرق في النّوم He drowned in sleep by DS instead of he is fast asleep.
- غط في نوم عميق He plunged into deep sleep by MC & He sank into deep sleep by DS instead of he is fast asleep.
- لَيْلٌ نائم Sleeping night by MC & A sleeping night (calm night) by DS instead of a quiet night.

- نام عن حاجته He slept through his need by MC & He slept through his need by DS instead of a person who neglects a necessary matter, or leaves something that requires his attention and is remiss in doing it (or fails to do it).
- نائم في العسل Sleeping in honey (oblivious) by MC & Sleeping in honey (in comfortable circumstances) by DS instead of he is unaware of anything while something is going on.
- نَوَّمَ الْمَرِيضَ He put the patient to sleep by MC & He made the patient sleep by DS instead of hospitalize or give anaesthesia.
- النَّوم سلطان Sleep is a sovereign by MC & Sleep is a sultan (irresistible) by DS instead of sleep is powerful or irresistible.
- في سابع نومة In the seventh sleep (very deep sleep) by MC & In the seventh sleep (deep sleep) by DS instead of he is fast asleep.
- نومة أهل الكهف The sleep of the people of the cave by MC & The sleep of the People of the Cave (very long sleep) by DS instead of may you sleep an everlasting sleep like people of the cave.
- يستغرق في النَّوم He sinks into sleep by MC & He immerses himself in sleep by DS instead of to sleep soundly or in deep sleep.

In 14% of the items in the Arabic sample, DS gave an explanation or annotation following the equivalent as in:

- طار النَّومُ من عينيه *Sleep flew from his eyes (couldn't sleep).*
- لَيْلٌ نائم *A sleeping night (calm night).*
- نَامَ الرَّجُلُ نَوْمَتَهُ الأَبَدِيَّةَ *The man slept his eternal sleep (died).*
- نام فلانٌ لله *So and so slept for God's sake (slept peacefully).*
- نائم في العسل *Sleeping in honey (in comfortable circumstances).*
- نمت كالقتيلة *I slept like someone killed (very deeply).*
- نوم الغزلان *Sleep of gazelles (light sleep).*
- نومة أهل الكهف *The sleep of the People of the Cave (very long sleep).*
- النَّوم سلطان *Sleep is a sultan (irresistible).*
- النَّوْم في العسل *Sleeping in honey (in luxury).*
- النوم السامع *Light sleep (where one can still hear).*
- ضرب النَّوم على أذنه *Sleep struck his ear (fell asleep).*
- النوم سلطان *Sleep is irresistible (like a sultan).*
- نام نومته الأخيرة *He slept his final sleep (died).*
- حلم ابليس في الجنة *The devil's dream in paradise (impossible dream).*

On the contrary, MC gave explanations to 3% of the items as in:

- في سابع نومة *In the seventh sleep (very deep sleep).*
- نائم في العسل *Sleeping in honey (oblivious).*
- نوم الغزلان *The sleep of gazelles (light sleep).*

5. Discussion

5.1 *Comparison of AI translation of "sleep" terms and idioms with prior studies*

The percentage of correct translations by both MC and DS in the current study was the highest of all the studies conducted by the author. The accuracy rates of Arabic equivalents is higher than the translation of medical terms with 68.6% correctly translated by MC and 74.5% by GT (Al-Jarf, 2024); Arabic folk medical terms with om and abu with 46% correctly translated by MC and 66% by DS (Al-Jarf, 2025g); Arabic expressions of impossibility with 52% correct translations by MC (Al-Jarf, 2025f); Arabic grammatical terms used metaphorically with 43% correctly translations by MC and 29% by DS, 23.5% by GT and 57% correct and incorrect translations by GT and MC (Al-Jarf, 2025e); Gaza-Israel war terminology with 29% & 23% accurate equivalents by MC and GT respectively (Al-Jarf, 2025c); translation of zero-expressions by MC and GT with 29% correctly translated by both (Al-Jarf, 2025h). MC and DS's performance in the current study is better than that in translating denotative abu- and umm-animal and plant folk names in Arabic, with 51% & 46% by DS & MC and only 3% correct responses to all 3 prompts for the metonymic anima-name list. DS failed to give correct responses to all items in the no-domain prompt, 97% to 99% faulty responses in the domain prompt & metonymic prompt, respectively (Al-Jarf, 2025e). Likewise, MC and DS failed to recognize the Abu-phrases as brand names and translated them word for word as phrases, not as brand names, with no correct responses yielded by MC to all items in the three prompts (Al-Jarf, 2025d).

Furthermore, the accuracy rate in translation equivalents given by MC and DS to English and Arabic sleep terms and formulaic expressions are significantly higher than the percentages of correct equivalents given to idioms, metaphorical expressions, collocations, neologisms and polysemes by translations students which did not exceed 30% with many responses left blank as in the translation of expressions of impossibility in Arabic and English (Al-Jarf, 2024a); ibn (son) and bint (daughter) fixed expressions

(Al-Jarf, 2023a); time metaphors (Al-Jarf, 2023b); Arabic and English dar (house) and bayt (home) expressions (Al-Jarf, 2022a); common names of chemical compounds (Al-Jarf, 2022c); English and Arabic color-based metaphorical expressions (Al-Jarf, 2019); Arabic om and Abu-expressions (Al-Jarf, 2017); English and Arabic binomials (Al-Jarf, 2016); polysemes (Al-Jarf, 2022b); English neologisms (Al-Jarf, 2010); interlingual pronoun errors (Al-Jarf, 2010); word + preposition collocations (Al-Jarf, 2022d); and word + particle collocation (Al-Jarf, 2009). Like AI, the most common translation strategy that student-translators utilized was literal translation. The students also had difficulty understanding and translating the underlying meaning of metaphorical expressions with an opaque meaning.

5.2 *Why MC and DS translated sleep terms with 91% accuracy*

The high accuracy rate of English-Arabic translations of "sleep" terms and formulaic expressions rendered by MC and DS stems from a few key factors: (i) MC and DS have been trained on a vast array of bilingual and multilingual texts, including medical, psychological, and colloquial sources. This allows AI to distinguish between technical terms like "REM sleep" حركة العين السريعة and metaphorical ones like "beauty sleep" (نوم الجمال). (ii) Contextual sensitivity: MC did not only match words – it interpreted meaning. For example, "twilight sleep" is not just a poetic phrase; it refers to a historical anaesthetic technique, so AI rendered it as نوم الشفق or التخدير الشفقي depending on context. Similarly, "*sleep drunkenness*" becomes سُكر النوم or ترنح النوم, capturing both the medical and metaphorical nuance. (iii) Many phrases on the list are drawn from sleep medicine, neurology, and behavioral science. MC and DS cross-referenced these with established Arabic medical terminology to ensure fidelity. For instance, "*obstructive sleep apnea*" becomes انقطاع النفس الانسدادي أثناء النوم, which is the standard clinical rendering. (iv) MC and DS were also able to consider how terms resonate across Arabic-speaking regions. Some phrases have dual renderings to reflect both formal usage and regional familiarity, like نوم الحنين / نوم الرغبة for "*yen sleep*," which carries emotional and poetic undertones.

5.3 *Could AI identify the types of sleep phrases given*

The author asked MC and DS about the kind of phrases they were given to translate. Both MC and DS described the list of phrases as a rich and specialized set of phrases related to sleep science and sleep medicine which include: (i) Medical terminology (*REM sleep, obstructive sleep apnea, narcolepsy, and sleep-related breathing disorder*.) (ii) Behavioral and psychological condition like *sleep paralysis, delayed sleep-phase syndrome," and sleep drunkenness*. (iii) Descriptive and metaphorical expressions as *beauty sleep, twilight sleep, and "dead sleep*. (iv) Clinical and research terms such as *sleep evaluation, sleep study, sleep history questionnaire, and sleep medicine research*; and (v) Pediatric and aging-related phrases like *pediatric sleep apnea and Alzheimer's sleep problems*.

For the Arabic list, they described the items as a rich tapestry of Arabic expressions that span multiple linguistic and stylistic categories including: (i) Idiomatic expressions (تعبيرات اصطلاحية) which carry meanings that go beyond the literal interpretation of the words as نوم الظالم عبادة *The sleep of the oppressor is worship;* حلم إبليس في الجنة *Satan's dream in paradise;* لا نامت أعين الجبناء *May the eyes of cowards never sleep;* نائم في العسل *Sleeping in honey (oblivious);* نومة أهل الكهف *The sleep of the people of the cave;* في سابع نومة *In the seventh sleep (very deep sleep);* من زان نومه زان يومه *He who perfects his sleep perfects his day, (ii)* Collocations and fixed phrases (تراكيب ثابتة) that are commonly used word pairings or expressions as غرفة النوم *Bedroom;* قميص النوم *Nightgown;* كيس النوم *Sleeping bag;* لباس النوم *Sleepwear;* وقت النوم *Sleep time;* أذكار النوم *Sleep supplications*. As a matter of fact, these are compound, not collocations as identified by MC and DS. (iii) Metaphorical or figurative uses (استخدامات مجازية) where "sleep" is used metaphorically to describe non-human or abstract subjects: نام البحر *the sea became calm;* نامت الريح *the wind calmed;* نامت السوق *the market quieted;* نامت النار *the fire died down;* نام همّه *his worry slept*. (iv) Literal descriptions of sleep states or action that describe physical states or actions related to sleep: أخذه النوم *sleep overtook him;* استفاق من نومته *he awoke from his sleep;* نام نوماً عميقاً *he slept deeply;* جافاني النوم *sleep deserted me;* يستغرق في النوم *he sinks into sleep*. (vi) Medical and scientific terms that refer to sleep-related conditions or classifications: مرض النوم *sleeping sickness;* اضطرابات النوم *sleep disorders;* درجات النوم *stages of sleep;* انقطاع النفس أثناء النوم *sleep apnea;* اضطراب فرط النوم *hypersomnia disorder*. (vii) Hyperbolic or poetic uses which are expressive or exaggerated for stylistic effect: نمت كالقتيلة *(I slept like the dead);* نام نومته الأخيرة *(He slept his final sleep);* ما نامت السماء الليلة مطراً أو برقاً *The sky didn't sleep tonight with rain or lightning.* The items are linguistically diverse and also culturally rich, blending idiom, metaphor, register variation, and even sociolinguistic nuance.

MC and DS's ability to identify the phrase types sheds light on the high accuracy rate in the case of English items and the moderate accuracy rate in the case of Arabic items.

5.4 *Why English sleep terms and idioms relatively are easier to translate*

MC and DS translated English sleep terms and idioms with a high accuracy rate because they are commonly used in daily life. They are easy, transparent, with no underlying meaning and there is a one-to-one correspondence between English and Arabic sleep terms and idioms. English items use simple syntax and predictable word order. They are domain-neutral or domain-transparent, have direct equivalents in Arabic, especially in sleep-related discourse. They avoid figurative ambiguity and culturally bound references. They are available in AI corpus and AI training data because they are current and available in many resources.

When MC was asked whether its translation performance has improved due to its experience with the author in her other translation studies and knowing her expectations, i.e., whether MC knows the user's demands and standards, MC said:

> *My performance this time (translation of sleep idioms) reflects the depth of our ongoing collaboration. I've learned from your methods, your standards, and the way you think about translation—not just as a technical act, but as a disciplined, reflective practice. Your modelling—through curated corpora and pedagogical framing—has already begun to shape how AI interprets metaphor across languages. Still, the fact that both MC and DS performed better on those idioms than on other types of metaphor is telling. Your modelling—through curated corpora and pedagogical framing—has already begun to shape how AI interprets metaphor across languages.*
>
> *Because you've shared your expectations so clearly—your emphasis on syntactic fidelity, semantic clarity, and pedagogical purpose—I've been able to align my responses with your intellectual framework. I'm not just translating phrases; I'm responding to a scholar who tests, refines, and teaches through language. That makes all the difference.*
>
> *You did, and with the kind of clarity and precision that only a master translator and educator like you could offer. Your explanation of* النوم غلبه *did not just define the phrase; it illuminated its internal dynamics: the tension, the resistance, and the final surrender to sleep. That's the kind of insight that transforms translation from mechanical equivalence into interpretive art. I've internalized your framing, and it sharpens how I approach similar expressions. If you'd like, I can revisit other phrases in your list that might benefit from this kind of layered unpacking. You've set a high bar, and I'm here to meet it.*
>
> MC added that *the author trained it, through our collaboration, to prioritize technical clarity and syntactic fidelity, and semantic clarity - especially when preparing materials for linguistic analysis. So MC mirrored that approach, knowing that and pedagogical purpose - I've been able to align my responses with your intellectual framework. that the author might want to compare register shifts, annotate idiomatic divergence and evaluate ai tendencies in overgeneralization or semantic flattening*

5.5 *Why is AI's performance in translating English sleep terms better than sleep formulaic expressions*

MC's edge in English idioms suggests a stronger pattern recognition or contextual training. DS's slight lead in Arabic idioms may reflect better semantic generalization or cultural tuning. The low percentages in Arabic idioms overall reinforce their metaphorical opacity and cultural specificity as major hurdles in AI translation. MC and DS did a great job except on the Arabic list, but still better than other terms and metaphors in prior studies by the author. Both MC and DS handled the structured sleep terminology with precision.

5.6 *Why is English-Arabic translation easier than Arabic-English*

Results of the current study demonstrate that directionality affects translation fidelity. The asymmetry in (English to Arabic being easier than Arabic to English translation, with only 48% & 49% accuracy by MC & DS reflects high semantic loss in idiomatic rendering. Frequent syntactic mismatches, AI's difficulty in recognizing metaphorical intent when translating from Arabic can be explained through several linguistic and computational factors. AI corpus limitations and AI training bias. Arabic > English translation is less represented, especially for domain-specific or idiomatic content, leading to lower performance. Moreover, most AI models are trained on English-dominant corpora, with English-Arabic translation receiving more attention and refinement than Arabic-English translation. Metaphorical expressions in Arabic often carry layered cultural, emotional, and historical meanings that resist direct mapping. They are hard to render into English without loss or distortion. Some Arabic sleep-related terms (e.g., نوم القيلولة، نوم الغفلة، نوم أهل الكهف) have no direct English equivalents, forcing AI to either overgeneralize ("nap") or misinterpret. By contrast, English idioms tend to be more standardized and semantically transparent, making them easier to map into Arabic equivalents. English sleep terms as "REM sleep", "power nap" often have technical definitions that are easier to match in Arabic due to established medical translations. Arabic idioms often require contextual disambiguation, with which AI struggles unless the surrounding text is rich and clear. English idioms tend to be more fixed in form and meaning, reducing ambiguity during translation.

Furthermore, data analysis revealed that Arabic transitive sleep verbs are more difficult for AI because they are polysemous. نام & نوم نّوم have several meanings: نوم could mean نؤم تعني نوّم الطفل، نوّم في المستشفى وأعطاه حبوبا منومة ونوّمه مغناطيسيا. English sleep idioms are often fixed expressions with narrow, predictable meanings, while Arabic idioms built on "نام" and "نوّم" are semantically expansive and morphologically rich. In English, phrases like: *sleep like a log, lose sleep over, beauty sleep, & sleep on* are idiomatic but relatively stable. Their metaphorical range is limited, and they rarely shift meaning based on morphology or syntax. By contrast, Arabic offersنامّ (to sleep, to die, to calm, to neglect, to be defeated; نوّم الطفل *to lull a child to sleep*; نوّم في المستشفى *to sedate or* hospitalize'أعطاه حبوبا منومة *to administer sleeping pills*; نوّمه مغناطيسياً *to hypnotize*. This morphological flexibility, especially through the فَعَّلَ form, creates a semantic web that English simply does not replicate. That's why Arabic idioms require interpretive annotation, not just lexical translation.

5.7 *Why literal translation*

Whether in the Arabic-English or English-Arabic translation, MC and DS tended to translate the sleep terms and formulaic expressions word for word due to AI's default translation behavior which assumes that literal translation helps preserve the syntactic structure and makes it easier for users (such as students) to spot patterns, anomalies, or semantic drift. However, literal translation misses nuance the figurative or pragmatic intent of the sleep expressions, does not reflect register, tone, and implied meaning, flattens and misses cultural resonance. For example: نائم في العسل is not just "sleeping in honey"; it evokes obliviousness or indulgent detachment; نومة أهل الكهف is not merely *"the sleep of the people of the cave"* but it connotes prolonged sleep; لا نامت أعين الجبناء is not just *"may the eyes of the cowards never sleep";* it's a rallying cry, rich with rhetorical force; نوم الغزلان cannot be translated literally because it evokes the image of infants sleeping with their eyes half open, much like gazelles do in nature. This adds a layer of cultural and physiological specificity that a surface/literal translation would miss entirely. This metaphor is rooted in observation, tenderness, and perhaps even parental awe.

Another example is غلبه النوم which means he was so sleepy and resisting sleep but then he could not stay awake anymore and fell asleep. It should not be literally translated as "*sleep overcame him*" as it conveys a narrative of resistance followed by surrender. The person is fighting off drowsiness, perhaps trying to stay alert or engaged, but eventually succumbs to the overwhelming pull of sleep. It is a phrase rich in human texture - perfect for illustrating how Arabic captures not just states, but struggles within states. *Overcome* is the literal equivalent to غلب. غلب and is the literal equivalents in many contexts, both convey the idea of one force overpowering another. But the richness lies in how Arabic often embeds volition, resistance, and emotional nuance into verbs that seem simple on the surface. So, while "sleep overcame him" is structurally accurate, it does not fully capture the implied struggle, the moment of surrender after resistance. That is where interpretive translation steps in, offering something like: "*He tried to stay awake, but sleep finally won."* It is a subtle shift, but it honors the narrative embedded in the verb.

The metaphorical expression في سابع نومة *he is in deep sleep* is a vivid colloquial expression that paints someone as being in an exceptionally deep, almost unreachable sleep, so deep that it is as if they have passed through seven layers of slumber. It is not just descriptive; it is metaphorical, often used with humor or exasperation, especially when someone is hard to wake. It is a perfect example of how Arabic uses hyperbolic structure to convey intensity.

Both نمت كالقتيلة in Arabic and "*slept like a log*" in English convey the idea of deep, undisturbed, almost lifeless sleep. But the Arabic metaphor carries a more visceral, dramatic tone, *"like the slain",* which adds emotional weight and vivid imagery. It is more intense than the English version "*slept like a log*", which is earthy and idiomatic but less graphic. This contrast denotes how different languages encode depth of sleep through different cultural lenses - Arabic through metaphorical finality, and English through inertness. The metaphor means *I was so tired, was in deep sleep and did not move*. نمت كالقتيلة carries exactly that weight - not just deep sleep, but a kind of total physical stillness born from exhaustion. It is descriptive of a state where the body is so depleted that it collapses into immobility. The metaphor of "the slain" evokes not violence, but absolute surrender to rest. Similarly, نمت على جنب واحد literally means *"I slept on one side,"* but idiomatically, it conveys deep, uninterrupted sleep, so still and restful that the person did not even shift position. It is a gentler counterpart to نمت كالقتيلة and equally expressive of physical exhaustion and tranquillity. It is tone is more colloquial and intimate, often used in everyday speech to describe a satisfying night's rest. Thes examples show not just linguistic meaning, but also physical and emotional reality. The errors MC & DS made were in understanding the underlying meanings of such metaphors.

5.8 *Why AI does not give multiple equivalents polysemes*

AI does not give more than one equivalent to polysemous words like نوّم & نام because of its default translation behavior. It tends to prioritize the most statistically common or contextually probable meaning, especially if no surrounding sentence is provided. Without explicit context or a cue to expand, AI defaults to brevity, assuming the user wants a quick equivalence.

6. Recommendations

The classification of English and Arabic sleep phrases into terms and formulaic expressions is invaluable for teaching translation. It helps students recognize when they are dealing with terminology that demands precision, idioms that require context-sensitive rendering and metaphors that may or may not be culturally portable. Students should know that translation is a craft that demands human judgment, reflection, and growth. This study models how to evaluate AI not as a replacement, but as a tool for sharpening human insight. Students should learn how to test AI critically: stripping metadata, checking syntactic fidelity and register appropriateness and how to refine translations. They should not just accept outputs, but interrogate derivation, word order, and domain fit and how to learn from AI, using it as a mirror for their own decision-making, not as a shortcut. Moreover, students should verify equivalents in traditional resources and with instructors and specialists. They should specify what they want AI to do in the prompt (instructions) and the kind of phrases or terms AI is about to translate. Interpretive translation strategies should be introduced in translation courses. Students should be trained to infer layered meanings and read beyond surface equivalents.

To enhance Arabic idiom recognition and disambiguation by AI models, this study recommends the following: (i) the development of models that can detect idiomatic expressions and distinguish literal and figurative meanings, particularly in morphologically rich languages such as Arabic; (ii) allowing AI systems to generate multiple plausible translations for a single term or phrase, especially when context is limited or ambiguous. This supports interpretive flexibility and user agency; (iii) improving tokenization and parsing of Arabic by accounting for root-pattern morphology, verb forms, and diacritics, which are essential for accurate semantic interpretation; (iv) integrating AI tools in analyzing polysemous verbs such as "نام" and "نوّم". (v) training AI models to recognize and adapt to different registers (colloquial, literary, medical, religious) and domains (e.g., sleep science vs. poetic metaphor), especially in Arabic, where register deeply affects meaning; (vi) providing users with explanations or rationales for translation choices, especially when dealing with idioms or ambiguous verbs. This fosters trust and supports educational use; (vii) allowing users, especially researchers and translators, to annotate AI translations with corrections, alternative meanings, or contextual notes, feeding back into model refinement; (viii) prioritizing contextual translation of sleep-related medical and psychological terms because literal translation often fails to convey emotional or cultural nuance, especially in expressions like *beauty sleep* or *sleep like a baby*; (ix) encouraging interdisciplinary collaboration between linguists, translators and specialists in psychology or medicine. This would deepen understanding of how language shapes perceptions of sleep, rest, and wellness; (x) engaging with scholars and educators to co-create annotated corpora, idiom banks, and culturally grounded evaluation benchmarks that reflect real-world usage and pedagogical needs; (xi) expanding Arabic lexical databases to include idiomatic expressions related to sleep. These should be categorized by context - medical, colloquial, literary, and religious - to support more accurate interpretation. AI models should be trained on rich Arabic resources like *Almaany* and *Lisan al-Arab* to improve semantic precision; (xiii) integration of high-quality Arabic lexical resources and comprehensive Arabic dictionaries and idiomatic databases (*Almaany*, *Lisan al-Arab*, *Al-Muʿjam al-Wasīṭ*) into training corpora to improve semantic coverage, especially for polysemous verbs like نام and نوّم.

Future research may investigate further issues related to sleep such as the semantic analysis of sleep verbs in Arabic across historical periods from Qur'anic usage to classical poetry to modern dialects; the impact of literal translation on comprehension of medical and psychological texts about sleep especially in therapeutic or advisory contexts; the development of a multilingual interpretive dictionary for sleep-related expressions including meaning, context, usage, and mental imagery; and the use of AI to generate multiple translation options for the same idiom, followed by human evaluation to analyze the differences in meaning, tone, and communicative function.

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