# Stone Speak: Can Artificial Intelligence Provide Comprehensible Texts for Incidental Word Learning?

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# Abstract

Reading compelling, approachable material in another language is a powerful tool for language acquisition; however, learners often have difficulty finding comprehensible texts to read in their target language. Artificial Intelligence models of language (deep neural network language models) have reached an inflection point and can produce lengthy, interesting, and comprehensible texts comparable to human written text. This paper analyzes the samples of an exemplar language model trained by the researcher to produce texts in English and Serbian. Language models are helpful for creating artistic works, skill level graded texts, and some bilingual texts. Language models can catalyze any learner’s engagement with language regardless of background or resources.

*Keywords:* extensive reading, Teaching English to Speakers of Other Languages, deep learning, partial translation, incidental word learning, Artificial Intelligence

# Stone Speak: Synthetic Text for Learners of an Unknown Language

Power is expressed through language. To use a tongue without the hegemonic languages of our time is to be silenced—to be unheard by power, to relinquish or leave rights unrealized. Today is a unique opportunity for artificial intelligence models of human languages to open the gates of power for underrepresented language learners and accelerate the learning and understanding of low resource languages by speakers of globalized, hegemonic languages in order to foster cultural communication, exchange, and respect.

Lack of access to language learning opportunity for people without money deprives them of social, economic, and ideological capital to pursue happiness and justice within their belief systems and communities. Krashen, Mason, and other researchers have argued for exposing students to “i + 1” content: new language and concepts that build on the current level. Much word learning happens through inference, and adults can acquire language much like children—the notion that our hemispheres separate and we can no longer acquire language in the same way is not legitimate because that separation happens much before young people are thought to be unable to acquire language through exposure to the language (Krashen, 1982, pp. 10–11; Krashen & Mason, 2015; Nation, 2014; Rodrigo et al., 2004). One issue students of another language struggle to select is authentic texts that allow for comprehensible, pleasurable (Krashen, 1982, pp. 164–165; Krashen & Mason, 2015) input at their level. Mason (2019) advocates for guided Self Selected Reading, where students are initially guided toward texts or at least a small library of books with simplified language for their level (graded readers). Unfortunately, many teachers are not trained in facilitating student led language learning, and many libraries do not have an adequate selection of graded readers in the native language of their country, not to mention in other languages such as Russian, Turkish, or even French, German, or Spanish in many cases. Students do not get connected to authentic texts in most cases, and many immigrant students lack social capital to even know who to ask. I repeat: the need is for students to access comprehensible texts daily

Language is a big factor in the life people, especially immigrants, live. As Bonny Norton says,

In this view [describing her idea of ‘investment’], learners invest in the target language if they anticipate acquiring a wider range of symbolic and material resources that will increase the value of their cultural capital and social power. It thus signals a learner’s commitment to learn a language, given their hopes for the future and their imagined identities. (Norton, 2019)

When students make an investment in language (Norton, 2019; Peirce, 1995) in order to have more agency and live in step with their hopes, the access to resources is anything but even. This is a local and very participative reality for many immigrants, especially those in quarantine with even less access to contexts with fluent speakers of English and outside commitments like local weekly language learning groups. For many, the lack of a workable approach is enough of a barrier to prevent them from exercising their rights and receiving equitable treatment and a chance to thrive economically and within society.

Many studies and even meta-analyses of incidental word learning (Daskalovska, 2016; de Vos et al., 2018; Nakanishi, 2015; Uchihara et al., 2019) have shown how students can “pick up words” as they read or interact in other ways with the language, but one study in particular highlights how students, even learning in a second language, interact with an unknown language through partial translation. In Pellicer-Sánchez and Schmitt’s (2010) article, “Incidental vocabulary acquisition from an authentic novel: Do things fall apart?” they had students read Chinua Achebe’s *Things Fall Apart* and then tested how advanced Spanish students of English as a foreign language learned words of an unknown language—the “Idemili dialect of the Nigerian language Ibo” (p. 37)—that were contained in Achebe’s novel. Students could remember meaning 84% and spelling 76% for the language encountered, and they could recall them from memory for meaning (55%) and word class (63%) (p. 31). Their article is not the sole warrant of this paper, but is a unique illustration of how effective partial translation can be as well as one example of how code-switching while reading is a minimal burden if the content is “comprehensible.”

This paper investigates the use of language models for learners of another language.

In a gradual but astonishing sea change, computers now are comprehending and composing human language at society’s level of discourse. This is evidenced by the work of such artificial intelligence language models such as the Silicon Valley based OpenAI's Generative Pretrained Transformer (GPT) neural language models, especially the fully released GPT-2 (Radford et al., 2018) and in the midst of release GPT-3 (Brown et al., 2020). Natural language processing scholar Christopher Manning distilled the definition of a language model to a “system” that guesses “what word comes next” (2019). Language models allow students or facilitators to generate human languages by providing a prompt of a word, a phrase, or sentences to the model to which the model adds a specified number of tokens (a token generally being a word, part of a word, or punctuation according to the mapping of the model’s vocabulary from a human word or subword to numerical representation). In the past few years, the quality is high enough to make many synthetic texts indifferentiable from human authorship (even leading to concerns including “astroturfing” through the generation of fake news). The models can also translate and perform well on a number of other language related tasks such as identifying parts of speech or filling in the blank—they represent general intelligence in a nascent form that may be leveraged not only for novel engagement but also utility for learners.

Synthetic texts allow students at the beginner to intermediate level to have access to proficiency level appropriate reading on demand, allowing extensive, comprehensible input—

one of the most powerful ways to acquire vocabulary, collocation, and even grammar (Krashen & Mason, 2015; Krashen & Terrell, 1998).

My argument is that large neural models of language are helpful for language learners in generative and translation capacities such as storytelling, creative writing, translation, and extension of texts based on difficulty as evidenced by sentence structure. I further argue that they can be trained bilingually in an essentially unsupervised manner (no labeled data or huge parallel text corpora needed) to reach low resource and globalized language pairs in an economically self-sustaining campaign. I do so by training and reporting the results of a large language model (more than 500 million parameters) trained on the hegemonic language of English as well as Serbian, generally regarded as a low resource language with regards to Machine Translation and availability of high quality parallel texts between the languages. This model allows for extensibility to other languages that use the Cyrillic script, unlike the original model trained with this learning algorithm (GPT-2). Finally, I conclude with the invitation that anyone with even nominal interest should begin building a server funded by cryptomining and aid the development of language learner friendly language models (LFLMs) for relevant language families, leveraging this dawning epoch to render justice and language resources rather than increasing surveillance, discrimination, or profit maximization.

This model trained and considered in this research, referred to as Učiса (oo chee tsa /uːtʃ it sɑː/ for “learns” and učit for “teach”), goes above and beyond approachable texts available through a library or the internet or phrases or brief passages translated with Google Translate. Učiса offers novelty as well as the chance to create with an artificial intelligence model in web accessible forms like [write with transformer](https://transformer.huggingface.co/doc/gpt2-large) or a self-funding server that can be built for about two thousand dollars or less.

Eventually my hope is to leverage the capacity to generate artificial texts to support a text recommendation classifier (think Good Reads powered by AI) that can link students to existing articles and stories graded to their level through difficulty analysis or partial translation and also incorporate artificial stories and texts as occasional articles the students can read. This would be called something like “Harbinger” and the aim would be to facilitate entering into what Csikszentmihalyi (2008) refers to as flow. The aim is to reduce learning friction and focus low resource language learning so students don’t waste time and don’t give up. An obvious additional advantage is the potential for book clubs (or reading club for a more broad designation), allowing students to encourage and learn from each other, sharing the ideas and stories they encounter and catalyzing what Dörnyei et al. (2016) describes as motivational currents that see “motivation not simply as a springboard for action but also as a uniquely self-renewing and sustainable process” characterizes by flow through years or lifetimes.

Language models are trained on large bodies of text, corpora, and traditionally those corpora have been huge sets of sentence by sentence parallel sentences (bitexts)—available in English to French or German to other western languages or even more difficult pairs of large languages like Chinese to Russian. But not in most other languages, for example Sioux, Inuit, Basque, Bashkir, or dialects of India. This is an access issue—low resource languages have less access from a given home language to hegemonic languages like English, French, Chinese, and Russian and as a result less social and economic capital. In part, the models are difficult to train because even if you have an unsupervised training model like GPT-2 that can take in most any sort of text, parallel or otherwise, it still depends on a “vocabulary” the 50,000 or so subwords or characters that are most common in its database—it is through this constellation of tokens that the model is able to calibrate the shape of human language, in the process limiting itself to common/needed characters. For example, GPT-2 cannot use Cyrillic script words effectively, leaving out not only Russian but also any other languages using the Cyrillic script either wholly (such as in Russian or Ukrainian) or interchangeably with other scripts, such as Serbian, which employs both Latin and Cyrillic scripts. One can transliterate from one script to another in this case, but in no way is that possible when it comes to pictographic languages or languages with multiple endemic scripts such as Japanese’ hiragana, katakana, and kanji.

Each set of characters or word are assigned a numerical model for a given model, its vocabulary, which means a new language invariably means retraining on a new vocabulary: it means using having video cards that cost six thousand dollars each along with the technical expertise to use them; it means the electricity needed to power a Walmart for an hour to train the new model—but it means more than just this: meaning making through computation is restricted to the hegemonic powers of the world: it means privilege working unto power.

Does it have to?

No.

Though there is much computational processing time in the creation of large language models for a language pair or language family (Oncevay et al., n.d.), I believe all languages can have access to high quality language models that enable early reading in either hegemonic or low resource languages. Further, I believe this fungible through the use of self-funding servers and older generation video cards, transporting half-decade old hardware from just junk to just, cyberpunk junk.

Through training, analyzing, and subjectively evaluating the initial results of a language model with mostly English and Serbian texts, this paper explores uses of language models for practitioners and facilitators of second language (L2) reading and argues that teachers of English or other languages should avail themselves of and invest in support of artificial text methodologies to foster comprehensible reading contexts that accelerate and honor students where they are.

The further structure of this paper sets out upon the following road: a brief methodology section describing the training and use of an artificial intelligence language model, a results and discussion section summarizing the output of the model and three use cases with discussion forwarding the promise and limitations of these use cases, and a conclusion summarizing the study and suggesting future computational and educational inquiry.

## Method

As alluded to in the introduction, a language model runs statistics on what word is most likely to come next. As it generates words, the model bases its next guess on the previous guesses of words, the probability of a given words as it flows through the layers of matrix multiplication, and whatever prompt or previous text is provided for the model to consider. After the model has been trained by guessing the next word in millions of texts and receiving minute feedback and adjusting its constellation of words, parts of words, and punctuation and their relation to each other, the model can be used to produce texts in line with the human languages it received training in. So, for example when the trained model receives a prompt such as “In the winter, Canadian geese migrate to Florida and spend their days fishing”, the model reported in this paper will respond in the following way: first, it will encode the words to its numerical representation of about 70,000 tokens (words, subwords, punctuation, and even single letters) or 75,000 tokens that it developed through evaluating frequencies on its initial training set. After encoding the data, it feeds it into the initial layers of a neural network. Think of this as the coin sorter a child might have—just like a quarter or a penny can be put in any slot (the context parameter of 1024 tokens considered), multiple pathways can lead to one eventual end categorization—the chosen next word. A layer of up to more than 40 trained matrix multiplications and a layer giving the probability of the top 8 to 56 “top-k” probable words allow the model to guess the most probable next word with some randomness given the previous sequence, paying “attention” to which word is likely as it steps each word through the whole sequence (if goose was likely for almost all the previous sentences, it is more likely to appear in a following sentence, even if it is not the most common word to follow “I saw a…”). From there, after it has chosen the first word, it repeats the process with the first word now in the sequence it is predicting from until it reaches the default or requested length of the prompt. So, for example, given the previous prompt, the following is generated (top choice out of 20 attempts):

In order to evaluate how useful language models are for people learning a language, I generated twenty samples each for the following use cases: stories, parallel texts that alternate between English and a low resource language (Serbian), and skill adjusted texts (simple texts versus texts with advanced structures and words).

Gpt-2 is a language model developed by OpenAI unique in its ability to produce text on its own and to learn as a monolingual person would acquire a new language . Most neural machine translation frameworks are Bidirectional Long Short Term Memory (BiLSTM) models (Manning et al., 2019), which look at the words preceding and following a word and pick the most likely translation based on the whole sentence, essentially translating (encoding) a sentence in one language (say French) into an intermediary computer language and then trying to write that computer language sentence into another model, decoding it into another human language (say English). Conversely, Gpt-2 focuses on the probabilities of words with reference only to their preceding context (it is aware of up to 500 words that have proceeded the next word it intends to guess). Training a new version of the GPT-2 architecture allows for helpful tools for language learners such as partial translation, stories, or articles in a students’ target language.

The language model itself is the program pattern released by Nathaniel Sheppard from OpenAI’s GPT-2 language model, trained on a similar data set collected by a project called Open Webtext to emulate the original training data. Webtext, as opposed to Open Webtext, is the name OpenAI used for their training set made up of hundreds of thousands of text files from the internet that were included based on having a high rating based on the Reddit website (Karma scores). Using that dataset in conjunction with Serbian texts from Wikipedia and other openly available bodies of text (corpora), the vocabulary of this model includes the Cyrillic alphabet and many common Serbian words in both Latin and Cyrillic scripts (as both are used in written Serbian). The original model of GPT-2 is unable to use Cyrillic alphabets and thus cannot be used for Slavic languages (only, for the most part, Latin script languages). (research for reputable citation) This provides unique challenges and opportunities for linguistic inquiry regarding the connection between our concept of a word and its presentation in multiple scripts (this phenomena is also present in Japanese or other languages where Latin scripts are often included in daily life alongside other scripts).The dimensions of the model are larger than typical language models (dimensions available in Appendix A, which describes the neural network model in more depth), and it was trained with the help of the [blinded research site] using two Tesla V100s.

## Results

The following three samples (with alternate top texts for the given prompt included in appendix B) allow for a consideration of the current bilingual language model’s ability to produce text for language learners. Humbly, these results suggest that language models may be both trainable and helpful for language learners of or from low resource languages as well as for their advocates. Each section introduces a quote generated by the model for a given pedagogical or content aim, based on a prompt (italicized) that was given to the model to add to or try to complete by generating language as probably as humanly possible. The quote is followed by discussion for ease of reference.

The model can produce topically cohering, bilingual texts based on the level of Serbian or other low resource language the model is exposed to. This “partial translation” is profitable to pursue in a mixed methods study as shown by Norbert Schmitt and Pencelar’s research with Ghanese words as Spanish learners of English read “Things Fall Apart” by Chinua Achebe, and it is also similar to the Russian words found in the *A Clockwork Orange* study. In a collaborative, action research setting, I hope to design a research projects with Serbians in an English as a Second Language setting (collaborating with the Serbian community networked through [blinded]) and in an English as a Foreign Language setting (collaborating with the schools and network of extended family in Serbia).

### Bilingual Sample

*Natasha is selfish. She bought a teapot for her grandma, but she wants it herself. Nataša je sebična. Kupila je baku čajnik, ali i sama to želi. She* loves and despises, as does the daughter of Zadrid, a fellow, who had once worked as a carpenter for the king. The daughter she had was a nurse. Kupovala je na pijacu. Nataša je bila devojka dok je bila u starosti. Baka je bila mlađa devojka. In the end, Nataša's only sin seems to remain intact. Nataša ima samo tri sinove. Her grandmother dies during war, and the other daughters are the victims of battle during that wars of conquest. Vrhka Nataša umire tokom rata, i druge majke su bivile žrtve rata. In the book The Shire of St. Ignatius, a Serbian writer mentions only the end of a battle. U knjizi Skoti Pišnjakovu, srpske urednike napisuje samo završena masa. It begins with the battle of Caracalla in the Alps. Igra se završava u napuštanju Caraca, a završava se u Vase. The name of this war can also be applied to Serbian culture. U srpskom se može promeniti njen naziv na srpske. The Serbian language is not the same, for example, [end of text]

Even this excerpt drifts, but it shows a variety of discourses that can be taken on by the model in both languages (historical narrative). A student can generate bilingual text on a topic of interest and have an interesting or interactive experience looking up words or learning them by rough context, experiencing potentially pleasurable and comprehensible input.

The model can also act as a zombie trailer, reading the texts a student views online and then bringing language back up as it generates samples or talks with them. The model can generate a small excerpt and then have the whole conversation recycled with whatever new input the user provides, allowing for dialogue practice with a student.

In one sample, the model also continues a story, alternating between languages: “Soon the car would have a bird hovering around a tree. As it went down she noticed it standing in the tree. "To je rano da da ovaj čovek pogleda." [It’s too early for this man to look] "Oh je čovek još uvek pogleda." [Oh the man is still looking at her] Lisa's eyes were wide open to the white cloud.” This has potential for reading and guessing meaning to learn what happens in the story, supporting incidental word and phrase learning while allowing the primary focus to be on reading for meaning and narrative.

### Narrative: a Comparison of Text from a Large Model and a Small Language Model

Once there was a girl named Magdalena. She was brave and strong. When the autumn came, she went into the woods, and called out that a witch had been slain. Magdalena spoke to the young girl. "You don't know what happened to me?" It almost seemed that her mind was going blank. "Why did you do what you're supposed to do?" Magdalena asked, her hand still held up in a fistful of her hair. "I'm going to get your back, you tell me what you want me to do." Her voice was almost as wide as it was human when she'd turned her head. Magdalena made her way up the stairs, her heart pumping hard. They started talking about the last time they saw each other. Magdalena was a groggy, beautiful woman, a beautiful girl, but she'd been taken into her dreams and emotions instead of hers. She was, like Magdalena, a human child and she wasn't even a child. In some ways that's kind of like saying Magdalena was a grog, her skin was so black that it was like, "This is me!" But then she knew that she needed to be seen, and she got in her hair and saw her. She couldn't believe she was actually a child, she thought, just like everyone else. "I've been sent here for this time, you've got me." "You're a grog?" Magdalena called out. "I'm the one in the village called Auntie Magdalena. My name is Magdalena Magdalena, but now I'm going to call you to make sure you're not forgotten now, for I'm not the one who has gone in the first place." Her eyes twitched. Her voice was cold when her mouth throbbed again. "The boy in here, Magdalena Magdalena. I thought I'd tell it to get him to the witch. He has a soulful soul who lives in one of the most beautiful, the most beautiful and pure the world has ever known. And in all those dreams he says, this is me, Magdalena Magdalena, and we're going to go back to one of the dreams you saw all through the dream." The girl looked at Magdalena and the girl who was staring her in the face, as if thinking, as if saying, "See what I did for you and to bring your spirits up here for you!" "My name is Magdalena Magdalena Magdalena," Magdalena piped up. "That's the story you told me about the place you came from, you told me about the way you were, and I've told you about that before, too." "How," Magdalena replied, "are you going in?" Magdalena said simply, "Yes, Magdalena Magdalena." "Well I'm going to send you this story of the past twenty days, Magdalena Magdalena." "How many are there now in there?" Magdalena asked, as if it was normal to expect a family of ten. Not at all surprised, not at all. "It's four of us," Magdalena said, "and then we go and get out of here." Magdalena stepped forward, her foot dragging her in the direction. "We go out of here, Magdalena Magdalena Magdalena Magdalena Magdalena." Her head turned, the man was dressed like a witch in full combat boots. "Now you're going to leave this alone? What do you wish is done?" Her head turned to stare out the window. Magdalena stood beside her, a child in the middle of the night. Her head slowly stood. Her father was wearing a cowhide shirt and hooded boots. She had never heard of a witch before, she said. She knew that Magdalena didn't want anyone to get into her fairy tale world, but she knew a lot about the way she lived and how she fought to stay a fairy in the real world. "Do you want me to tell you?" Magdalena asked. "Because we..." Magdalena said in a way that she almost didn't understand, as she stared out from her mother's window to her mother, the baby in a gilded coat in her mother's lap. She was a pretty girl, but she knew no more than anyone else. Her mother was a lady, not just a princess, and she wouldn't help anyone else out in a fairy tale world. Her mother was a [end of generated text]

Now, here is another story, told by a neural network trained for this research on a video card that costs 4% the resources of the two Tesla V100s cards in [research site blinded] supercomputer center. This model is dubbed humble\_Učiса:

Once there was a girl named Magdalena. She was brave and strong. When the autumn came, she went into the woods by the side of a woman who had been in good health. Her figure was always white, white, and with her lips red, with her teeth a very gentle color, she appeared. As she advanced she saw Magdalena, who was walking with an air of quietude, with her face pale, and her eyes still on those of an old age—not that they were of the habit of her face. She had been at the head of the man, with a look round her. Her glance was almost full: for now the figure was blue; she saw that he had just become a member of the congregation in that house; now, as the man, this woman, she appeared and was very polite. And the woman was more in the person's eyes than in her attitude toward him; she had evidently noticed that the white face of Magdalena was the pale color of her face, the lips were of white and pale black, and its eyes, like the stars, saw in a look of great beauty. At length she paused, and looked at the speaker till his eyes met her eye, but she did not seem to hear it. She was speaking now as the child asked; not even to ask whether he did not hear or see her. She was looking too full with her eyes fixed on her black forehead, until she was half inclined to think she would not let her voice drop as she had hoped. At length it seemed that Magdalena knew at once. “You are so pale, I do not hear. She seemed to me now.” “I hear something of you, Magdalene,” she said, in a weak voice, and looking back. “I saw that her face was crimson and a sheet, that looked very bright in her face.” The women paused again; the girls were on their feet, and the women would see that the women were as red as they would feel the faces of a woman or a girl. They did not get a closer look to the woman again, and then she ran on quickly, and her arms were as white, and she would have gone over her knees to be kissed. She felt that her husband was going to be kissed, and that she loved her husband, for what she loved to be loved. “What is that?” demanded Magdalena, whose voice had been no sooner from herself than she had heard. “Nothing,” answered the girl. “I believe that she will be happy to see. I have no doubt from you, Magdalene.” Magdalena looked pale. “I am glad.” He did not speak. She looked around with something like a sweet smile. “Do I, Magdalene?” he said. Magdalene had hardly spoken. The two women never spoke to him, but she had taken no notice of him; she was much to him: some of that he would not, and she would not tell what was coming of him. There are some of the girls whom you know of no use, he said presently. For he was not quite sure that they had been married at all at the time, and were not without a marriage, and he was much to himself. But what was the consequence? It seemed to be an imprudency of the child’s character that he was not well matched by the child. There were many who had been married, but had not been married. Perhaps she had heard them at one time. Even had Magdalene heard of his marriage before the first one which she had ever heard. It seemed like a joke of some woman who appeared to the child in the middle of the family, who did not, except herself, thought it to be the first one who might come and look after him. But Magdalene had come to the point with a good deal more natural than he thought….

## Discussion

Though language models are awkward to use for the time being, they can make it very easy to read at an earlier level of acquisition and to “play” with language; getting to know it in the process. For low resource learners of English, the model can be fine tuned to their level of proficiency, perhaps with a Bayesian adaptation of their “prior” knowledge into a more general corpus of “fluent” English. Specifically for Serbian Language learners, the ability to create custom English texts may serve as a divertive and skill relevant methodology. For learners of low resource languages, the use of parallel storytelling and comparison might allow for a meaningful and problem-solving interaction with texts. Looking forward, exploration of the sentence endings of Serbian language may be of additional use.

Neural language models (deep machine learning models of language) can endow developing language learners with adequate resources to learn a language easily and proficiently, and this can be achieved through partial translation, custom generated texts, and awareness of student ability levels. First language texts with target language words slowly introduced can allow students at developing levels of language learning to learn many words by inference and enter into “flow” (Csikszentmihalyi, 2008) early on in their learning. With a surge of successful breakthroughs in text generation, the equivalent of graded readers may even be able to be generated through language models, and the underlying structure of both partial translation and learner text generation are similar, and neural language models are able to abstract a relative skill level and lexical familiarity of learner, and they can also perform multiple cognitive and linguistic tasks that may aid learners (Radford et al., 2018). Finally, language models have the ability to incorporate awareness of a students’ ability and prior knowledge through neural Rasch models (Ehara, 2020; Ehara et al., 2018), further tailoring content to allow students to enter into a motivational current (Dörnyei et al., 2016), especially when these models allow for partial translation and participation in community activities centering around low stakes texts, such as news articles or book clubs (any ebook or public domain text could be mostly translated into Serbian, for example, but English words fitting to students’ levels could be included).

For this reason, partial translation of self-selected web texts based on word difficulty is both possible and effective. With the advent of neural language models (Mikolov et al., 2013), a machine learning model that predicts the next most likely word based on how words usually appear together, it is possible to rank (Martinc et al., 2019) word difficulty in a text and also incorporate assessment of learner proficiency through the Neural Rasch Model (Ehara, 2020). A deep learning model is a model with layers of computer modeled neurons with a defined input and output and multiple hidden layers that allow the model to estimate parameters or categorize, and so or this instance, a deep learning model can classify a word into eight classes (think the six language proficiency levels of the Common European Framework plus “ultra-easy” and “ultra-difficult” levels) of word difficulty and translate only the nonattainable words.

### Limitations

Some special issues are apparent: “The bird swam towards Lisa. Its head collided with an ice cube. The sky was a black blur. It darted along the ground and floated into the darkness. A cloud began to fill the air. The sky was frozen.” (line 443) This demonstrates what [OpenAI refers to in its original model](https://openai.com/blog/better-language-models/) with the following, “Nevertheless, we have observed various failure modes, such as repetitive text, world modeling failures (e.g. the model sometimes writes about *fires happening under water*), and unnatural topic switching.” (Alec Radford et al., 2019)

Also, the model keeps hearkening back to the initial prompt, so the prompt could be tempered with more content to direct the response, instead of causing samples that focus on a dynamic like color: “There seemed to be a bird on a roof, there were black wings, and the owl's head, green and white, had white and white wings, as well as a white head.”

One significant limitation of the model, even as it progresses in training, is the dearth of Serbian language texts and the lack of a “convincing” and effective connection of a language to two different scripts—even though Serbian in Latin script can produce nominal parallel texts, the Cyrillic language aspect of the model can not infer or transfer that inference or idea (the language model thinks there are three different languages: English, Latin Serbian, and Cyrillic Serbian). This could be ameliorated by converting all Latin script into Cyrillic script for the language model, but this limits transferability of English loan words and spellings and also does not reflect the “ambidextrous” Serbian eye that can read their language in either script (much like the three different scripts of Japan). This is a shortfall in language modeling, and I am actively pursuing a literature view on the use of multiple scripts to represent one word in human cognition and artificial neural network language modeling. The use of Cyrillic is of value, because it allows for transfer learning and helpful inquiry in adapting a model between different Slavic languages even after its initial training. Also, many corpora, such as the Serbian Wikipedia, include texts in both languages, and ideally the model should be able to read through a text without the need for preprocessing. Word and phrase conceptions tied to sound (phonemes) may be possible and helpful, but it does not model human intelligence because language is still experienced in deaf culture in the absence of sound and the presence of kinesis—hand, body, and eye movement. We do not encode words to their true sublingual state analogous to human intelligence, and this represents an area fruitful for exploration.

## Conclusion

Language is a justice issue. Language models allow tailored texts for under resourced learners and allow scholars to refine and develop free, public language education, thereby granting power and opportunity.

As the training of this model progresses, a few key limitations and opportunities present themselves. The model is an interesting personality for artmaking.

Also, language models are able to imitate and build on not only complexity but also language features and style, suggesting that they can generate skill appropriate texts with adequate training and a layer of filtering that screens for and categorizes generated texts into an appropriate level for learners.

The end of the matter is that language models can produce novel language when given extensive texts with variety and quality. They can also be trained to fit to language features and figurative registers, providing an opportunity for adequate training texts for students’ learning. In time, projects like Hugging Face’s distil-GPT-2, which minimized the model while maintaining its generative power, offer promise that language models can be trained and serve learners with technological architecture that costs two thousand rather than twenty thousand dollars. Finally, it suggests the need for a developed Serbian and English corpus that also includes longer works in one language while having an adequate “connective tissue” of parallel texts.

AI research is currently starkly separated into “haves” and “have nots” where the few have powerful home computers, leisure, a videogame and hacker culture, and resources to learn. The many do not have any general code training or access to computation at home or through a super computer center, and this edges them out from the benefits of big data and artificial intelligence in their community (such as quality, accessible translation and language education), access to economic capital and the pride of an in-demand skill, but most of all of having representation and agency in the surge of a technological sea change in the midst of cresting. Artificial intelligence and big data contain bias and perpetuate it, and minorities for the most part have no say in how this is addressed or considered.

In conclusion, this large model produces readable, interesting texts in two languages, and this can provide reading opportunities and eventually skill level appropriate texts for learners through relatively small adjustments to the model that researchers and interested learners can perform on an mid-tier gaming Desktop or limited university computational resources.

The journey set out upon by this paper is taking a turn toward artmaking, further exploration of personally learning a language from generated texts and local language communities, and the assembly of a shareable and expanded Serbian corpus, but I hope that neural language models can provide equity to learners and speakers of less studied and less resourced languages in a time where communication and cross-cultural learning is more difficult and vital than ever.

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# Appendix A

The model was trained on two Tesla V100s for about 100 hours per epoch for a total of three epochs; gradually adding more text progressively. The hyper parameters are as follows:

Optimizer: Adam at a learning rate of 2.5 e-4

Vocabulary size: 70,000 trained and encoded with sentencepiece

Context (for attention and size of samples processed): 1024 tokens

Hidden layers: 1200

Embedded layers: 1200

Attentional heads: 25 (this is more than typical, even for a large model)

# Appendix B

Below are several alternate generated texts with brief discussion during the trial and final production runs.

### Alternate Story Prompt

*Once upon a time, there was a young girl named Princess Magdalena. She was kind to the horses in her kingdom and would lead them to water and verdant green pastures. Her favorite horse was named Fatty Lumpkin, and Fatty Lumpkin was a gray mare. One day, they took a journey to a* water castle at age fourteen and they were about to go on a journey to a water castle. At age thirty years and fifty years old, there was a village called Phyll, or the Phyll of Throne. It was a very well named Chihuah, but one day, on a mountain, when there was a water castle called Phyll, there would be a great castle where the town was completely collapsed. During the first days of the 18th century, a woman named Marna, who had been married to the same girl for twenty years, decided to marry the woman who had been married to one woman. It took a long while before the family would go on record as the King, she was also a slave who had been married to the other women; she also had a son named Mitham. It is a very small, handsome, long-distance, low-density village, with a great variety of people and traditions and lots of family and lifestyle that are almost to no extent a single man’s daughter. The girl has a beautiful, bright, gentle heart that is as strong as a mountain. In the early days of Phyll, the family decided that she had to marry Marna in the south, and they wanted a woman named Throne, a youngster named Lumpkin, who would marry him and his friends. She also wanted to marry Marna and Marna, but did not want Marna to make it. He had a sister named Abyna, her brother and sister who would stay in Phyll when she came to Phyll and took her to the king’s mansion. This gave Marna a good nightmarish feel, he would not let Marna marry his children with them, and he wanted her to join them in his quest. It was very beautiful, and she loved her. Marna was the last surviving bride to get married….

This is much too disjointed to be called a story, but it does show potential to maintain characters, build on and develop relationships between those characters and their context, and to create original names and locales.

Once upon a time, Lily the fairy queen lived with her unicorn friends in a castle. But then one day, the princess came over and the young princess came over. In this situation, she was always the first princess to make a choice and she was the princess. It was a very short period, she did not have time or time to be proud of. It was never a very long day; this is not a very long period to be satisfied at all. I don't think this was a romantic choice; the way it has happened at home is very hard work and it has never been done at home. But for me, the question to all these people is, where are they? They are very intelligent, I think. They are, and the more things I know, the more I will always be in this. But for me, this is not my hobby; the first is not my job I have always done; the way I have always done things is to work, I think, that is my job. That is my life and it is my work. I still get better, the more I am able to do whatever my soul will. But what it is is my hobby, I find it, and when I am a young man I have an influence on me. And when I am young I come into that feeling of being in the same life that I am, a young lady or something. In a sense, I can feel some sort of spiritual impact. I have always loved to do anything to keep me from going through this, and I still feel a lot to me, but at the end, I don't know if these things will ever be worth the money, the way that they all feel and the way that I am. I feel that my life is a whole lot different. So, it’s not like I went back into it when I was eighty weeks old, I still have never heard someone say that, "Give it. It's not the money I have to repay. That I owe them, or if I owe them, I owe them. There is no one to repay you, for the money I owe. I think of themselves as being good, but I'm always a little bit ashamed of having had money in the bank." I'll tell you, the moment I had to leave the house, I thought I had just finished it, and that it didn't seem like any longer until I was twenty. I was so worried that we didn't feel that much. It was always very strange, it was a great way for

This shows uncanny descriptions of thought and emotion.

### Alternate simple/complex prompt

*Lisa walked through the Blue Ridge Mountains, and it was very beautiful. She saw a bluebird in an aspen tree and stopped to gaze awhile as it swayed in the wind, but then* again, the bird ran across its path, and it reached out to the bird, who in turn made it very likely that the creature was about to fly over there, but it still had a very bad reputation as a person in the animal kingdom itself. The other of the birds was not at all familiar with the animal life. Their names seemed to have been very similar and the fact that the birds were in fact very different than the humans from other races that were in fact some of them. Their faces were brightly colored and black. They were very similar, and they were very similar. They were not the same. They were very small, almost like any other hunter in the early colonies of the Middle East. They were different from those around them, but a similar tribe was more similar than their races, so their names were pretty similar. On the other hand the people had a very different opinion of the tribe, but they were different. In some respects their own names were so strong that they were not in the sense of a single word. On the other hand the people believed that if they were not there, I had to find a place where I could take pictures of them, and it became a very clear possibility. I had to

gpt-2-gen run-root "Once there was a girl named Natasha who was cursed to only think of herself. Even when she wanted to get a teapot for her grandma, she would think, 'At least I'll get it when she dies.'" --tokens-to-generate 512 --top-k 24

*Once there was a girl named Natasha who was cursed to only think of herself. Even when she wanted to get a teapot for her grandma, she would think, 'At least I'll get it when she dies.'* And she would take a teapot. But she was the only Teapot that she needed. It was too late for her to take the teapots so she could get them. And she was the only Teapot that she needed so she was able to help her. And when she died of dehydration and became pregnant, she was able to be around her, too. But she was in fact a girl, so she didn't even have to give birth to any baby. This was one of the more unusual times for a girl that lived and worked with a child that was so beautiful. She had an amazing life and her parents never talked about it. And that was something that was unique. This is one of those things you will encounter when you are having a kid's life, and in fact, that's part of it. And that is part of the whole. How did you start your life so early because you had a son? He looked up at the sky every day. He was still around. They looked up at the sky. What were these? How were you going to get here? He looked up at the sky at night, like he was going to be a boy. He was going to be a kid. That's why they all looked up at the sky at night, so he was a boy. How had his parents taught you how to be a boy? How were you going to get here? He was a girl and he was the only one. In fact, he was so perfect for a man that was already having children, so he was the only one he could get a girl. And that is what it was going to be like if he turned into a boy, and he turned into a boy. And in the beginning, he was such a beautiful boy. But when he was young he was a boy. How was he going to do? He wanted to take a girl from her life that was already there, because he would go to school for girls. So he took a girl from her life to a school for girls for girls. And when he was young he was so perfect for that. So you see, he became a girl and he became that. That was the thing about it. Is this true? Yes. Was that because his parents always said you couldn't be a girl for girls?

The italicized portion is the user provided prompt, and the rest of the text was generated by the model:

*Lisa walked through the woods under the green trees. She saw a squirrel.* She was dressed in a black cloak that looked half-full-body. She had some white armor on the back. She turned down the trail, turned over to face him. With all the lights in the trees, she had a good eye on him, and went into a room. He sat at the door. A man, who was sleeping in on the street. He came to see the guy next door. He looked up. Something was inside. The man sat on the corner and took off his helmet. "Come on." He said. He stood up. There was this silver light. It was dark and there was a woman with a black coat standing on her arm. "Hey, he's looking to steal the blue suit from me for free. Give it to him, too, but he doesn't look like he's going to rob the shop. Give it to him, too." He looked away. He smiled. "Hey, we got your blue suit," he said, motionless and the man was gone. "I want to know what happened." He stepped outside. "And the red light shows the [end of text]

This prompt shows some potential of storytelling, the underlying bias of the training set in how often men are described in this and other instances, and how the model is imitative but does not yet perceive the through line of characters as well as long term dependencies of pronouns and those characters. The model can also provide more detailed, mature responses as evidenced in the following:

*Natasha was selfish. She did not get a teapot for her grandmother.* As for her family, she was very proud of them and wanted them to know how she felt to others at that time. When she was 16, Anna was a little girl, but was very unhappy by herself and also very afraid of how to do more to others. And she did not let anyone say anything to her but she was afraid of the things she would say. So Anna decided to do it. In her early years, Anna became so nervous. She didn’t trust people, so she felt that Anna needed a good job. They didn’t trust her at the time, but she wanted to be her best friend. They knew about Anna, and they knew how the only thing she wanted to do was to go through all the issues, including Anna’s mother and everything. Eventually, though, it became difficult to keep a good, supportive spouse. When it became too hard for Anna to accept, Anna found herself struggling with anxiety, but they kept working hard, making sure that it helped, and that they became friends. They also were struggling with a lot of mental health issues, so when Anna started taking selfies she felt the same. But now she was feeling less lonely, but found a therapist, so when she started taking selfies, it was so easy for her to go to the therapist. So, after she had been a little girl, the anxiety went away. The anxiety stopped. So they took Anna to a psychiatrist. They got a psychiatrist to talk to her, and she went to a hospital. They asked if she was worried. And they took her to an emergency room, and she got a little treatment for her asthma. As an emergency medicine for her asthma, her treatment went away. But, as her symptoms went away and she was taking medication to try to get help herself, the stress went away. But, at last, she was so desperate. Because the anxiety changed, she was worried that she would get sick again, so she decided to go through the pain. So, she decided to go through her selfless experience. When she went to the emergency room for her asthma, she knew that she was worried for Anna. And she knew that there was no other way to deal with. Eventually they made the decision to end this journey, so they had a decision that had been left to the counselor to help with the treatment, and to have Anna go through the anxiety and try to end the suffering, [end of text]

This introduces an alternate character, but it also takes the story into a tone similar to a mental health narrative, as opposed to a more fantastical or medieval story as in the former example. Also, it carries the topic of the story and Anna’s character all the way through 512 tokens of narrative, suggesting potential for story-telling and interesting texts for students to read. See the alternate text in Appendix C for a similar prompt with more complex language.

### Bilingual Parallel Texts

In contrast to these artificial texts, one perhaps obviously unsuccessful task was the parallel generation of English and Cyrillic from only two sentences:

*Today we went apple picking with the family. Данас смо ишли са породицом на брање јабука.* С. Т. Мја, ћерка су била и мајка, са којом је имала љубавница, а која се такође бавила оцем са родитељима. С. Т. Мја, која је живела на пијаци, била је жена са сестром и сестрама, што се чини оцем, а и мајка је родила и сестру Магдалена. И. С. Мја, сестра је била кћи са својим пријатељима. <|endoftext|> Дион Дион може да буду: <|endoftext|> Јабло Јабло је назив за термин који значи „мој да је у ствари било коју другу“. Назив који се односи на његову верзију јесте „наз“. На пример, Јабло је био први пут употребни, а други је у ствари приказан да је за време његовог живота била „нестад“. <|endoftext|> Аргинг Аргинг ("Cosoporidae") је насељено место на истоку Румуније, у северном делу земље, Република Хрватска. До територијалне реорганизације у Хрватској налазио се у саставу старе општине Тигран. На попису из 2011. године, Аргинг је имао 249 становника and a third in 2014. године насеље је имало 1.864 становника. На попису становништва 1991….

While English reasserts itself interstitially near the end, the generation task is an obvious failure pointing to the need for either a more extended prompt or more parallel texts in Cyrillic (the vast majority of parallel sentences provided to the model were in Latin script).

In an attempt to generate a bilingual script with Latin Text, the following sentences were generated (user provided prompt in italics):

Today we went apple picking with the family. Danas smo išli sa porodicom na branje jabuka. Tako smo ti putili porodice, kao i kod oca, koji se uslikuju u kući. A kosti kosti kosti je: “Zim se u kući”, ali je taština sestre kosti kosti, jer ona kosti je kosti kosti. A kosti je kosti i kosti. A je kosti i kosti. For if that person is with us, we don’t have any money. Pajteći da li ne kaza ni ne kaza se na radovima i ne viču. I ako se radovi, don’t let us have a story, just tell the story. A kosti je kaza koja kosti je gaseo oko sebe, jer smo bili toliko. I’ve never heard a story of him. I’ve seen a film about him, and it’s never taken so long. A kosti je kaza gde nam je to i maza koji treba da ga u kući, ali da se kaza u kući. A kosti nije dobro tako što kaza koji se bave. The same can be said about him, but I’m not sure how long his time is spent watching his movie.

This sample shows how the model is able to attempt parallel translation, but not in any great form of consistency or usefulness at this point in the training.

### Text Generation Based on Difficulty

This first sample is written in a style with more advanced constructions in the prompt:

*Lisa walked through the Blue Ridge Mountains, and it was very beautiful. She saw a bluebird in an aspen tree and stopped to gaze awhile as it swayed in the wind, but then* came in a strange spot along the way. She saw it all, but it was clear that it was white. Her eyes began to fade away as the sky approached, and her eyes were suddenly falling by. As they slowly turned around, the sky rose over them, and the red light of light disappeared from the sky. Her body, or even her eyes, could still stand. Her eyes were a black, tiny pink-colored brown, and she would go up and out, for a month, or maybe three months or three, fifty or so. The sun was dim, and it was dark, and her eyes would be darkened with light. She watched, like a cat, and as her eyes flew over the sky, she went to sleep. She watched as she watched, her eyes would be darkened, and her eyes would be darker. Her mind was still. In the beginning of the night, my gaze was on the sky. At night, I had become increasingly concerned with what was going on, even when it was dark and scary. And when, at night, I went with a new name: The New World (The Black Panther, Black Panther; Green Panther). I had also lost sight of the Black Panther[end of generated text]

This has a more nuanced sentence structure and imagistic quality than the simple prompt, included below:

*Lisa walks up the hill. The hill is great. She sees a bird, but then* she knows her name. I have seen people in the streets and I know her voice, but I am certain she knew her voice as an adult, but I had also seen her voice, so we didn’t know it. My own thoughts were all different, it was wonderful, I think. It had so many wonderful moments, it was beautiful. The best thing about my friend who is in this city, I think, is for sure. I don’t know if someone in my city knew that I had something to say about me or not. It was amazing. On Sunday, August 10, I woke up one morning in the cold. I was on vacation in a city called Chiba. I woke up, I was in the freezing rain while the night was over. I am still in this city, I am still a little confused. I woke up the next morning, I wake up every morning in the morning and I woke up one morning. The worst day in a row for the city came when people were calling us. We had to take some showers every night. I don’t remember being there, and that day was over for us. On the morning of August 13, I was sitting down the street and watching the sun [end of generated text]

This second sentence has a lot more subject, verb, object structured sentences, and this suggests that the model can at least produce textual results that imitate the sentence structure and perhaps the difficulty level of the text provided, especially if the model is finetuned to detect and emulate texts differently depending on the proficiency level (by providing it with a wide range of different skill levels and styles of writing). The figurative language is also significantly different depending on the prompt—the model seems to go into a creative, surreal voice in some of its responses when prompted by a more figurative prompt, suggesting that increased inclusion of poetry and literary texts can aid the model in varied diction and expression of ideas.

### Story with figurative language sample

Lisa walked through the mountains and saw a bird in a tree. She stopped to look at it, and soon realized the bird was not a bird. The same wind kept the little bird from making a stand out and forced it out there. What happened next is a story that the people of the Umbra. People have talked about a bird who was in the air with the bird in it for the first time. The Umbra lived in caves, at the sea, beneath a rock, and its eyes were closed by the wind. They called the Umbra a bird; it was called Taurus Rex. They thought that the Umbra was a bird, and had not been previously heard of it. But they kept making their decision and they had

Lisa walked through the Blue Ridge Mountains and saw a bluebird in an aspen tree. She stopped to gaze awhile as it swayed in the wind, and soon all was clear. She saw it turn around and let out a squeeze from the young redhead that was looking at her, who was still with the same white feather as they both had since the first shot. Advertisement “It’s a nice place,” the elder one said. She said, “Are we okay?” “Yeah,” the younger one said, “so my mom’s out here. The rest of the boys have some fun and some stuff to have. I’ll see if I can spot some of their adventures. And I know that you can expect another hunt. But that’s what I’ll hunt out for, so tell anyone who’s curious. Also look out to a place called Bison Ridge so I’ll see if there’s a boat out there.” “This one's a monster,” the younger one said. “Can you see where he could be?” “Dave,” the younger one chuckled. “We’ll just see where the sun rises.” “This is pretty cool,” the younger one said, “so this is my house first. And there’s like two things about this lake I’ll talk to

This shows some of the dialogue and story development of the model.

Lisa walked through the mountains and saw a bird in a tree. She stopped to look at it, and soon came to the sound of a shot. “No,” she said. “It makes me believe we can’t do that.” But she couldn’t hear. As she swung her sword, the sky flew in front of her, and many of the other birds were silent as they rushed toward the man. Another shot followed, and the one that had just been yanking her to the ground stopped. It flew toward the sky, and the one that had just been yanking her to the ground stopped. She was still sitting in the trees, watching the birds’ movement. Their vision was distant, the

This shows some ability for producing “Flash Fiction,” and training the model on a corpus of flash fiction would be profitable.

Lisa walked through the mountains and saw a bird in a tree. She stopped to look at it, and soon saw it had a white tent. And now that looked like it was a snake. One of the lions had lost five pounds, and he and one of the other lions had pulled to get it. The bird had no teeth. He looked at the tent in horror, but when he looked through his phone to the other side, he figured it was a man. The man was with a lion, he knew. He looked him up and his eyes started to focus. He saw the beast he was looking at on the ground, and the snake that was with him. It was a guy with a lion. It was dark out of shape

This sample shows some visual reasoning.

Some of the texts were scary:

Lisa walked through the mountains and saw a bird in a tree. She stopped to look at it, and soon it grew to be roughly five feet tall, long, thin and powerful, at the same time it stopped running. She turned around, and saw a large, black, black-sounding bird, the one with the horns of a man with a long, long beard. “There’s a white, black-eyed man,” she said. No one else could see it. “That’s him!” The man’s eyes flew open like the wind, and it was only then that she knew the white, black-eyed man appeared. The young man turned around and pulled himself up off the stump and started a

### First sample

This sample shows some movement towards translation as well as story telling:

atasha is selfish. She bought a teapot for her grandma, but she wants it herself. Nataša je sebična. Kupila je baku čajnik, ali i sama to želi. She wants the book. She wants to send a book to her daughter. Kupi čuje to kao sluga svom, jer je to samo privremeno dete. The children give this as a blessing. A ja mu poduzemo ljubav: ja imam ljubav udovicom, ali u njima ne pomirite; a oni to ne znate, to je ljubav koja ti pomaže. But now we share the love. They love each other more: but in them they don't know anything, that is love which they love. Onda car odgovori: Enoh pred Gospoda, daj nam dobro za ženu. Now that sentence is answered. The king speaks: Give us good food, but we hate one another, but he doesn't know that he is good for us. A kad to čuje ocu mom, čuće da je ljubav moja, i ako smo joj, i kakav čovek radi, oni će čuti dar; a kad to čuje ocu mom, čuće da je ljubav, ne. But as soon as she hears it, the son of man shall hear it, and will hear it, but they shall hear it only as a man lives: but a man who loves

This sample from humble-Učica also shows drift but with translation of a topic likely close to proceedings of the EU or another of the English Serbian parallel corpus used in training:

Natasha is selfish. She bought a teapot for her grandma, but she wants it herself. Nataša je sebična. Kupila je baku čajnik, ali i sama to želi. She has bought a big party, but she runs in order to save herself. She is not quite willing to pay a mortgage, but to find some money there. Svačala je ona najpopularnija koja je osvojila zlatne komade. Ova je spremna da je dodela tu godinu. Stvarica je poniđena te ponajala, ali ona je uspela da prikupi posao. The new government will decide next month's budget deficit target in parliament, but the country now must pass by next year. Novi budžetski vlada će se odrediti za sledeću šansu budžetske deficite u parlamentu ove godine, ali ta zemlja sada mora da usvoji. On the eve of April 25th, the government passed a major structural reform programme for Macedonia to build the country's largest minority government in the country. Vlada je 25. јула usvojila značajan strukturni strukturni reformski program vlade kojom je Makedonija građevinska najkraća zemlja u zemlji. The amount of the amount invested by the EBRD funds increased by 40 % to 37 million last year, compared to the previous month; a year slipped by a third from June. Krenina potrošena koju je uloženo u fond za finansiranje EBRD povećala je da će se 40 % zemlje iznos

Natasha is selfish. She bought a teapot for her grandma, but she wants it herself. Nataša je sebična. Kupila je baku čajnik, ali i sama to želi. She wants to save the day by having a ball. Nataša traži dan u životu sa bačenicom u ruci. "I'd better bring on a boy," he said. «Pao bolji čovek», ukazao je on. "He's your own mother; it's my daughter, and you've been giving her money for years--and she's so much more important to you than the girl," he replied. «Naj njus je svoje dete», rekao je on. "But have you known that, when the money is owed, she'll pay me back in a couple of days, until I can get her to the next stage of my life?" «Ali, zapalite mi, dajite mi, jer ću vratiti još neke mrak od svog života», dodala je on. "I'll pay my father half of the price," he said. «J'uporiću im da plaćaju moja mlađa mlađa dvoje, dok ću te platiti u nekoliko dana», rekao je on. "But I'll get her on, so I'll make myself pay more." «Ali će zusiti još veća gl

This sample shows novel sentences being produced in both languages with an unsupervised mode of training and limited parallel sentences and limited long form passages in Serbian.

Here too: “Natasha is selfish. She bought a teapot for her grandma, but she wants it herself. Nataša je sebična. Kupila je baku čajnik, ali i sama to želi. She was young and weak. So she hid happiness. When Nataša died, she was a young and weak person. Onda je Nataša bila živa i jaka ličnost. Ona je imala slabe veze sa njom. Ona joj je rekla: Znam da sam umela, ali nećete imati vremena da odem. Nataša nije imala vremena za nijesu tvoje. Nataša je bila tvoje. A time in life, there was no doubt that Nataša was a strong woman. Večan dan u životu, nisi bilo dokle nije bilo ni kada. "You would not have known that you were a strong man. You would never have known that you were a strong man. I wanted to be married to someone like you, as soon as I found you," the Albanian Albanian told the BBC. "Vatstvo je trebalo da živi u njoj, što mi vam verovatelje nisu bili, kada je na nju došao", izjavila je albanska albanska. A girl who lived with Nataa became his lover. Ona je dobila ljubavni odnos Nataše. Their daughter went the same way, she said. Dvojica su imala isti način i ona je.”

### Bilingual Story Prompt

This sample contains a Latin script English text followed by a Latin script Serbian script, ending with the English word “She” at the end to signal the desire for an alternating parallel text. However, as shown below, it takes an original turn beyond sentence by sentence parallel translation. Translations of the Serbian from Google translate are included in brackets:

*Natasha is selfish. She bought a teapot for her grandma, but she wants it herself. Nataša je sebična. Kupila je baku čajnik, ali i sama to želi. She* asks her daughter for it. The night is nearly there. The night is almost empty. "They have sold it to the homeless." "Kada su ga prodale, prodale su ga ljudima." [When they sold it, they sold it to people.] "But this is so nice!" "Ovo je ta tako je lepo!" [This is the one so beautiful!] "They want to spend time with our family. So that’s good for us too." The woman goes home. The mother and son go for work. "They sold it to the homeless." The mother is relieved and takes the family away. "I’m pretty sure my daughter is happy now." "Kada sam jutala, razam sam se." [When I muttered, I broke up] "I couldn’t tell anyone in Macedonia what was going on." The mother is relieved and gives the family a bottle of water. "The homeless will never have anything to work with." "Kumlje koje čine uvek neće ništa davati sa muškarcima." [The godparents who do it will not always give anything to men] "They can use their kindness again, but they don’t care." "Čušno ne pričaju, ali ih ne razumeju. [They don't talk loudly, but they don't understand them.] They sold it back to her. One by one, they let her have it. One by another, she gives up again. "