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### Ir nugalėtojas yra: from 0 to a little Lithuanian in an hour

**Tuesday, March 21, 2017** (0 Comments)

Posted by: Stephan Lewandowsky



#### Stephan Lewandowsky

(<http://www.psychonomic.org/page/lewandowsky>). And the winner is .... in 2014, cognitive scientists from University College London launched an international competition (<http://www.psychonomic.org/news/news.asp?id=296850&hhSearchTerms=%22memrise%22>), with a \$10,000 prize, to find the best way of tackling a challenge faced by millions every day, namely how best to acquire the vocabulary of a new language.

Prof David Shanks and Dr Rosalind Potts from UCL teamed up with *Memrise* ([www.memrise.com](http://www.memrise.com) (<http://www.memrise.com/>)) to run the competition. *Memrise* are the creators of a free online vocabulary learning tool and app, and so they obviously have a keen interest in understanding how to optimize learning. The \$10,000 prize made this one of the richest—if not *the* richest—competition in applied psychology.

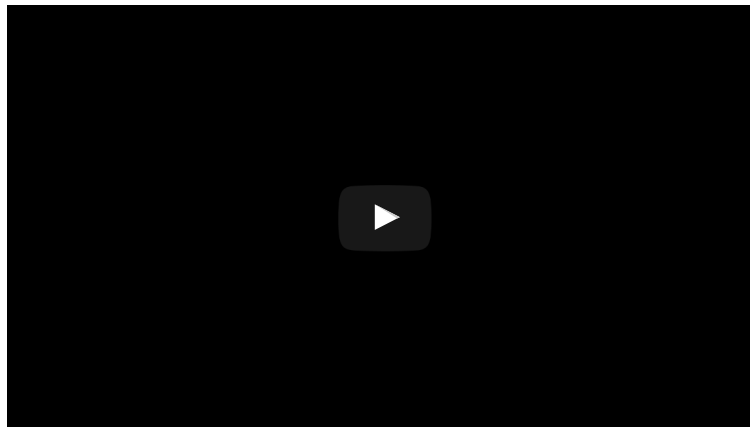
We have a century of research on memory and learning, and our knowledge base on memory is massive—the keyword “memory” returns about 135,000 articles in Web of Knowledge in psychology and allied disciplines. However, despite the plethora of research findings, it is not altogether clear how the various variables optimally go together—in other words, we know a lot about how to improve learning, for example by spacing the material, but we know

less about how spacing can be combined with other techniques to optimize learning.

If you want to know how to maximize learning in a given time interval, you need to know how to combine the variables that facilitate learning. Because existing research provides very little guidance, and because there is a potentially huge number of recipes to combine known features in different ways, Shanks and colleagues thought that a competition with the explicit goal to maximize learning might be the best way forward.

The aim of the *Memrise* competition was to provide an empirical adjudication of the best way in which our knowledge of memory and learning can be put to work in a real-life task. Real-world learners were given one hour to memorize Lithuanian-English translations, and their retention was tested one week later.

Here are David Shanks and Rosalind Potts explaining the basics of the challenge:



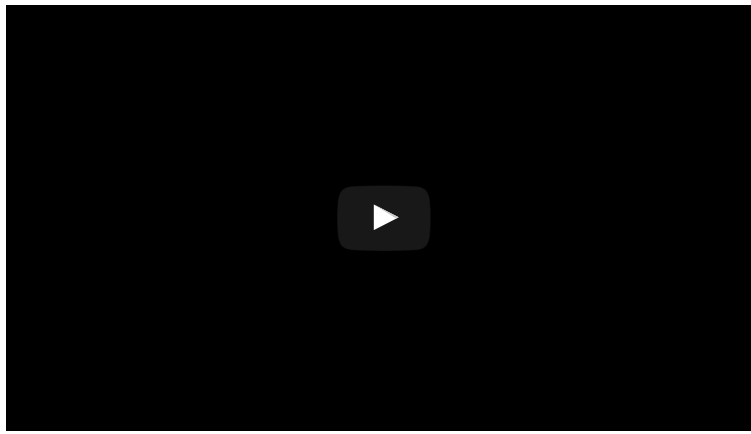
In a nutshell, the organizers of the competition provided a computerized baseline task against which competitors tested their own proposed method in their own laboratories or classrooms. Initially, 18 teams entered the competition.

The best-performing 5 teams proceeded to the next stage, during which their techniques were implemented in *Memrise*. The 5 finalists were then tested against each other in a massive online experiment, involving thousands of participants learning Lithuanian vocabulary, on the *Memrise* platform. Their recall of the words was tested after one week.

The winning learning method roughly doubled memory performance compared to the standard technique of repeated study!

And the winner is .... a team from the Donders Institute for Brain, Cognition, and Behaviour and the Behavioural Science Institute of Radboud University in the Netherlands. The project was led by Gesa van den Broek, a PhD candidate at Radboud University.

The winning entry was based on a computer program that made use of numerous variables to optimize learning. The program commenced by presenting an instruction video about mnemonic strategies. The video contained some very helpful and generally applicable hints—you can watch it here:



The video was followed by a sequence of learning trials that was governed by a sophisticated algorithm and involved several nifty techniques to enhance retention:

- An adaptive presentation schedule was used that incrementally added new words and distributed them across the 1-hour training session. The presentation schedule was sensitive to participant performance (participants who learned faster practiced more items) and item difficulty (difficult items were repeated more often). In a nutshell, the algorithm keeps track of the estimated memory strength of each item, based on its previous record during the session, and it presents words before their memory strength falls below a threshold. This automatically increases the spacing between repetitions over time and it creates more repetitions for difficult words than for easier words.
- Background images were provided to facilitate keyword visualizations upon introduction of each new word. Whenever a new word was added to the learning set, a photo of a room or place was shown together with the Lithuanian word. If you watched the instruction movie, you will know that the photo was provided so participants could think of a keyword in a language they knew, which they visualized somewhere inside the room or place in the photo. A keyword is a word that can be easily associated with the new Lithuanian word due to its phonological or orthographical similarity—for example, when seeing “lentelė” you might think of “lentils” as a keyword and place a bag of delicious lentils, in your mind’s eye, in the corner of the room in the photo. When you have formed that image, you would press Enter, and the translation of lentelė—table—would appear. You would then visualize a table in the same room with a bag of lentils on it. The program used 10 different photos (e.g., a living room, kitchen, or gym), each of which was initially associated with 6 new Lithuanian words. The photos were always shown during the first presentation of a new word and were shown again when a participant failed to recall the correct translation.
- There was repeated opportunity for retrieval practice (typing in the word). That is, after the initial encoding using the photo and keyword, the Lithuanian words were presented for cued recall without the background images. So when lentelė appeared, you would type the translation. If you remembered that the correct translation was “table”, your score would be updated and the next word appeared. If you mistyped “table” or provided some other, incorrect word, the correct answer would appear together with the background photo that you initially used to associate the word with its translation. Difficult words were usually practiced in this manner for 8-10 times, and easier words between 6 and 8 times.
- Participants were motivated by being given a high score. Every time the correct word was provided, the participant’s score increased by 10 points.
- Practice was self-paced but capped at a maximum. At any time, participants could accelerate the pace of training by pressing Enter to continue with the next word or trial. However, when participants did not press Enter, the maximum presentation times during encoding and retrieval were capped at 15 seconds. This ensured that participants did not waste a disproportionate amount of time on specific items.
- Twice during the 1-hour session, participants engaged in a recall test. They were first asked to think of all the photos that they had seen during training. They were then presented with photos of all the rooms, one at a time, and were asked to recall the visual imagery associated with that room during training.

So how well does this procedure work? Participants managed to acquire around 30 Lithuanian words in an hour, compared to around 15 with the standard baseline condition. For further details, stand by for the article that is being prepared by Rosalind Potts, David Shanks, and their colleagues. At the time of publication, the data from the trial will also be made available for anyone who wants to perform further analyses.

But for now, we can already conclude that applying our knowledge of memory and cognition roughly doubles vocabulary learning performance compared to a repetition-only baseline condition.

And to put this into perspective, here are 30 Lithuanian-English pairs that were used in the competition:

word	translation
daina	song
kede	chair
langas	window
nafta	oil
pupa	bean
sausainis	cookie
tvartas	barn
ziedas	ring
augalas	plant
duona	bread
krautuve	store
miestas	city
palepstis	broom
pyragas	cake
sokis	dance
upe	river
akis	eye
gele	flower
kreida	chalk
menulis	moon
pastatas	building
pinigine	wallet
smegenys	brain
urvas	cave
arbata	tea
durys	door
kardas	sword
mesa	meat
palaidine	shirt
raktas	key

Using the right techniques, you can learn all those in an hour. And if we can scale this up linearly, then even just 100 hours will give you the 3,000-4,000 words that are often considered sufficient for conversational language use ([https://en.wikipedia.org/wiki/Vocabulary#The\\_effects\\_of\\_vocabulary\\_size\\_on\\_language\\_comprehension](https://en.wikipedia.org/wiki/Vocabulary#The_effects_of_vocabulary_size_on_language_comprehension)). Maybe there is another competition waiting right here: can we speed up those 100 hours further?

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