

CapsLock



Slovak Programming Keyboard versus Layout Switching

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The Problem of Layout Switching

Alphabetical part of the keyboard known as QWERTY was designed by Sholes in 1873 [1]. This is the part of the keyboard that remains almost the same across Latin-scripted languages. Rest of the keyboard is modified to suit needs of different languages. Localization makes symbols used in programming languages hardly accessible. Therefore, many programmers prefer using the standard English (US) keyboard layout for writing code.

The majority of Slovak people who work with code or spreadsheets switch between English and Slovak layout depending on a type of text they are writing. Frequent switching of keyboard layouts is a multitasking phenomenon. Studies show that multitasking cost more time due to human context switching and leads to higher error rate due to insufficient attention [2].

Slovak only	Ľščťžýáíéôäň
English only	#\$%*\''{ }[]<>
Different positions	! ? ; , ' " @ - / = _ + % ()

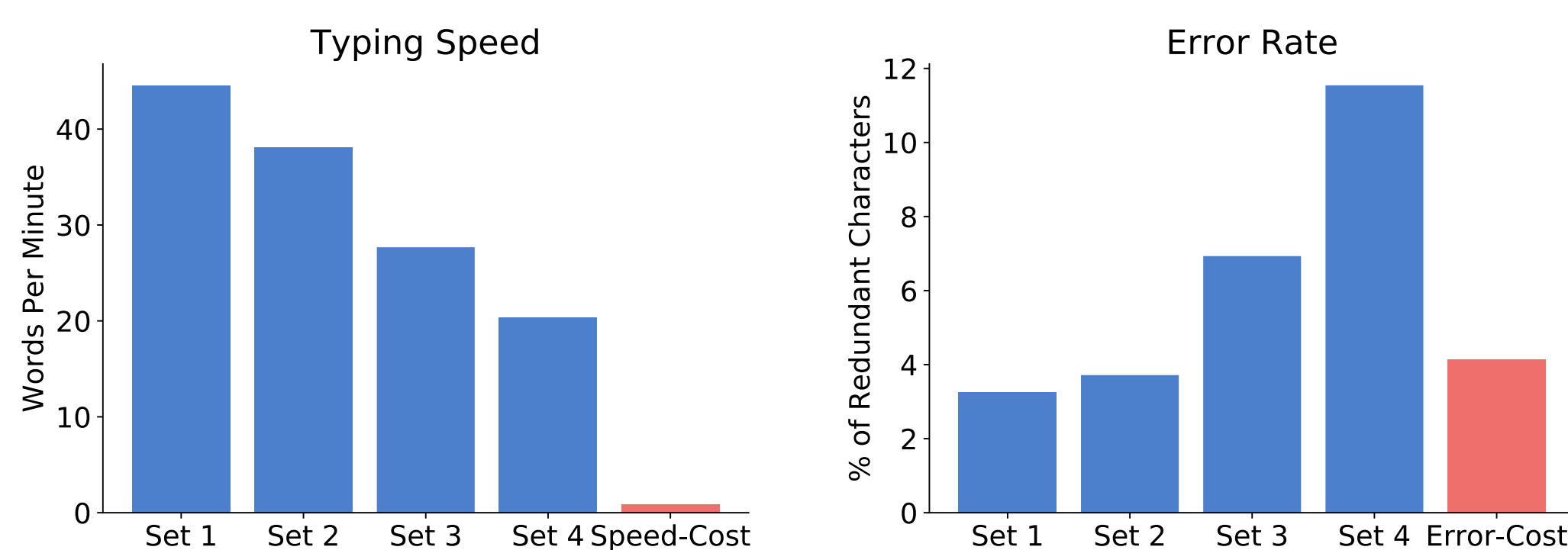
Characters from keyboard layouts

Typing Tester
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{Video} #Bezpečnosť "zranenia" Odpoveď

{Video} Bezpečnosť "zrans"

Typing tester online application



Averaged results from typing tester application with calculated switching costs

The Typing Experiment

I devised an experiment to test cognitive costs of layout switching. All participants were rewriting presented sentences from 4 testing sets that contained different characters:

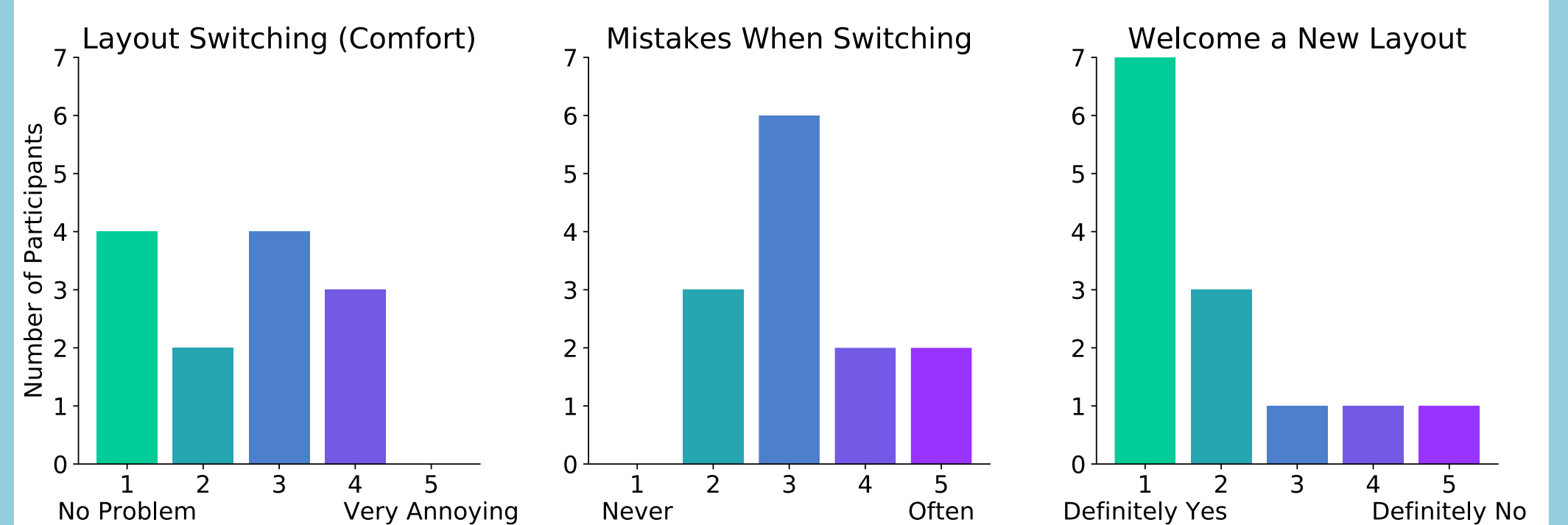
- Set 1: Alphabetical
- Set 2: Alphabetical + Diacritics (SK)
- Set 3: Alphabetical + Symbols (EN)
- Set 4: Alphabetical + Diacritics (SK) + Symbols (EN)

Last condition required layout switching. By comparing it to the other conditions I calculated the layout switching cost.

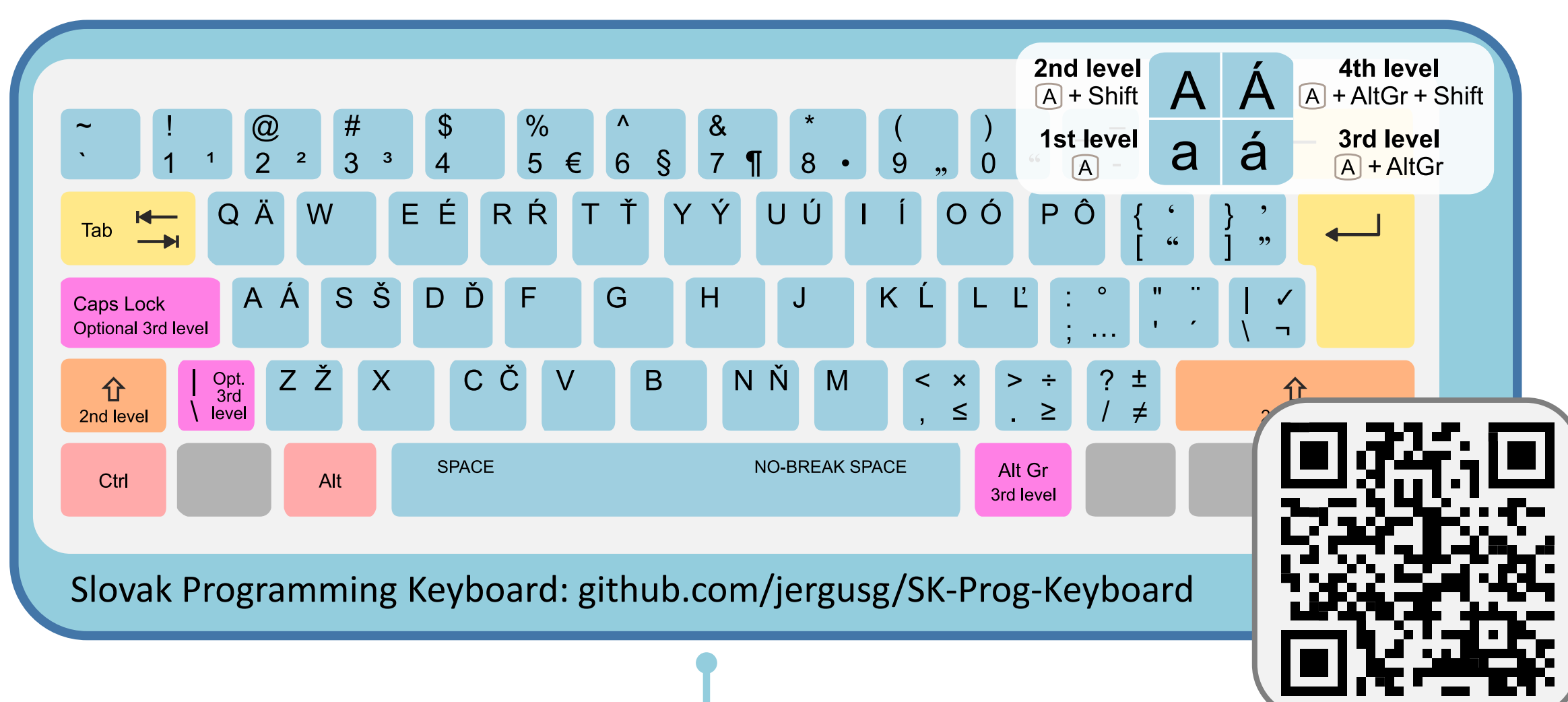
Results

13 participants attended the experiment. The average speed cost was 0.87 WPM (SD 5.19) which is a low number. However, the average error cost was 4.14 % (SD 5.60), meaning that participants' error rate more than doubled compared to writing Slovak text. Making errors is irritating and costs us more energy.

Participants also filled questionnaire with three Likert-type questions. 77 % of participants would welcome a new single layout designed for coding and writing Slovak text.



Results from questionnaire with Likert-type questions



The Slovak Programming Keyboard

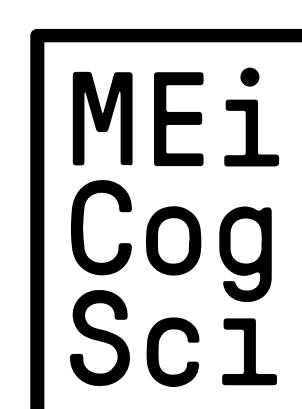
Independently from the experiment, I implemented the Slovak Programming Keyboard that adds Slovak accented letters on the top of the English (US) layout. Implementation was done for four major platforms: Windows, macOS, Linux and Android. Efficiency of this typing method has yet to be proven. It should eliminate cognitive costs and provide better comfort of typing compared to layout switching.

Acknowledgments

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References

- [1] S. J. Liebowitz and S. E. Margolis, "The fable of the keys," *The Journal of Law and Economics*, vol. 33, no. 1, pp. 1-25, 1990.
- [2] J. S. Rubinstein, D. E. Meyer and J. E. Evans, "Executive control of cognitive processes in task switching," *Journal of experimental psychology: human perception and performance*, vol. 27, no. 4, pp. 763-797, 2001.



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