

Linguistics Olympiads: Puzzle

When I was little, my mom used to buy my siblings and me books of logic puzzles. I would spend hours each day working in mine, eventually being sent outside to get some exercise “like a normal kid” my age. As I grew up, my interest in puzzle-solving led to a love of math. I eagerly viewed each homework question not as a mandatory task to complete, but as a fun problem waiting for someone to solve.

By sixth grade, I had become very familiar with MATHCOUNTS, AMC, and other middle school math competitions and spent much of my time training for them. But my desire to solve problems was insatiable. I tried participating in high school-level math competitions but lacked the specialized knowledge needed to solve the more difficult problems. I longed to be able to apply the same critical thinking and outside-the-box approaches I used in middle school math competitions—without having to learn the formulas and theorems necessary to succeed. Then my sister told me about a competition she thought I might be interested in: It was called NACLO.

Syntax, Morphology, and Equations—Oh, My!

A week later, I sat in the local high school library and stared at the stack of papers on the desk in front of me. “North American Computational Linguistics Olympiad,” read the front cover. I still didn’t quite know what “computational” or “linguistics” meant, but that didn’t matter: Before I knew it, the proctor said “Go!” and I opened my test booklet and got to work.

The first round of NACLO is a three-hour-long test that (as the proctor warned several times) most people are not expected to finish. It was easy to see why. There were interesting problems on language families and interactions between aliens and animals in different dialects—all featuring words, letters, symbols, and writing systems I had never heard of.

While each problem was strikingly different from the previous one, I noticed they all had a similar framework: Each featured examples of how the particular language worked through phrases demonstrating syntax (the order of words in a sentence), morphology (the proper conjugation of word forms), vocabulary, or a list of valid

numerical equations in a different language. We were required to translate new sentences into English or synthesize new sentences and equations in the given language. Thus, while knowledge of linguistics may have been helpful, it wasn’t required to solve the problems. After noting this, I was able to solve more and more problems. I left the test room pleased by the number of hard problems I had solved.

Level Up

In the six years between my first NACLO and my last, I qualified for the invitational round four times, doing better each time. While training for my last invitational round in eleventh grade, I was already looking at tests from the next level up: the International Linguistics Olympiad (IOL). Of course, I never thought I would qualify at that level, though.

To my surprise, a month later I got an email welcoming me to the U.S. Linguistics Team, which sent me into a state of excitement I had never felt before. My excitement, however, was soon replaced by fear. How could I represent my country when I didn’t know nearly enough about linguistics? How could I learn everything I thought I needed to in the three short months before the competition?

Realizing that the only way I could change things would be by studying, I got to work. Over the next 12 weeks, I taught myself about phonemes, morphemes, and all the other terms I sort of knew in order to better familiarize myself with linguistics. I also Skyped weekly with the rest of the North American team, taking practice



Contestants play Gaelic football in Dublin, Ireland, site of the 2017 IOL.

Puzzles and So Much More

by Joey Feffer

tests and learning linguistics and problem-solving techniques from our coaches. In July, I boarded a flight to Dublin, Ireland, the site of the 2017 IOL.

Counting on Hands, and Toes, and...

The first day of competition featured the individual round. Consisting of five problems in six hours, the individual round was a lot like the NACLO invitational round, but grading was based entirely on presentation of solutions. Even if you got the right answers, if you couldn't explain them clearly and coherently, you wouldn't get any points!

The very first problem put a smile on my face: It was an equations problem. But after a half hour of applying everything I knew, both mathematically and linguistically, I'd gotten nowhere. I tried solving the problem assuming its language involved a base-10 numerical system. Then I tried a base-20, a base-5, and a base-15 system, but nothing worked. What other numbers would make sense? I knew it couldn't be a small number, because there were too many different words in the problem that presumably signified digits. Furthermore, I knew the base couldn't be a multiple of five, because some patterns would have shown up in the bases I had previously tried. At the same time, I knew the base had to be meaningful in a society.

We use a base-10 system because we believe it is intuitive to count on our fingers; some cultures have base-20 systems because they include toes, too. So I knew a base-13 system would probably not exist. But base-12? If we started counting with our fists instead of our fingers, it seemed that would be a way to make 12. And it did make one of the equations in the problem make sense...I frantically scribbled what the rest of the equations would mean and solved the problem within minutes. The rest of the problems were hard, but more straightforward than the first. When time was called five hours later, I had solved three of the four remaining problems.

Over the next few days, we visited historical sites, played Gaelic football, and got to know other competitors from around the world. Two days after the individual round was the team competition. This time, four team members worked together to solve one problem in three hours. While my team didn't do particularly well, the problem, which dealt with translating emojis into Indonesian, was incredibly fascinating and had us working on it well after time was called.



Silver medalists included Joey Feffer, second from left.

The Gifts of Linguistics

The awards ceremony was held my last day in Ireland. The presenter announced the winners starting with honorable mentions. She moved through all the bronze medalists and was naming the silvers, and still my name hadn't been called. Right when I thought all hope was lost, I heard my name. My heart soared, and I walked on stage to receive my silver medal.

I gained much more than a medal, though. Pursuing linguistics provided me with an incredibly fun way to occupy my time, but it also got me interested in things outside of math. Learning about new languages exposed me to the variety of cultures and peoples on this planet, and learning about language families got me interested in the evolutionary history of humanity. Studying linguistics taught me about problem-solving and more, and I'm incredibly grateful for the journey. ■



Joey Feffer was a 2017 Presidential Scholar, a USAMO qualifier, and a six-time AIME qualifier. Joey, who was homeschooled, just completed his freshman year at Harvard University, where he is majoring in math and economics.

Learn more about NACLO at nacloweb.org.