Learning from OzCLO, the Australian Computational and Linguistics Olympiad

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Abstract

The Australian Computational and Linguistics Olympiad (OzCLO) started in 2008 in only two locations and has since grown to a nationwide competition with almost 1500 high school students participating in 2013. An Australian team has participated in the International Linguistics Olympiad (ILO) every year since 2009. This paper describes how the competition is run (with a regional First Round and a final National Round) and the organisation of the competition (a National Steering Committee and Local Organising Committees for each region) and discusses the particular challenges faced by Australia (timing of the competition and distance between the major population centres). One major factor in the growth and success of OzCLO has been the introduction of the online competition, allowing participation of students from rural and remote country areas. The organisation relies on the good-will and volunteer work of university and school staff but the strong interest among students and teachers shows that OzCLO is responding to a demand for linguistic challenges.

1 Introduction

The Australian Computational and Linguistic Olympiad (OzCLO, www.ozclo.org.au) began as an idea in late 2007, largely prompted by a parent in Ballarat, a small town in Victoria, who came across the North American competition (NACLO, Radev et al. 2008) on the internet and thought it was something that her daughter would be interested in doing. Her emails to the organisers of NACLO, asking about the likelihood of such an event being run in Australia, led to initiating contact with the Australasian Language Technology Association (ALTA) with the suggestion that a computational linguistic olympiad be established in Australia. Dominique Estival (then at Appen Pty Ltd, and a member of the ALTA Steering Committee) took on the project and, jointly with Jane Simpson (then from the University of Sydney), Rachel Nordlinger and Jean Mulder (from the University of Melbourne), ran the first ever Australian Computational and Linguistic Olympiad in 2008, with financial support from HCSNet (the Human Communication Science Network), and help from ALTA (the Australasian Language Technology Association), ALS (the Australian Linguistic Society) and CSIRO (the Commonwealth Scientific and Industrial Research Organisation). The first competition was held in two locations – the University of Melbourne (Victoria) and the University of Sydney (New South Wales) – with a total of 119 students participating from 22 schools. Given the success of this first competition, 2009 saw the addition of four new locations around Australia (Adelaide, South Australia; Brisbane, Queensland; Canberra, ACT; Perth, Western Australia) and the sending of the national winning team to the International Linguistic Olympiad in Wroclaw, Poland. Since then OzCLO has run every year, with the recent addition of two regions (NSW-North in 2010 and Northern Territory in 2013) and the participation of an Australian team in every ILO.

2 Philosophy, Aims and Principles

The immediate aim of OzCLO (Simpson and Henderson, 2010) is to introduce high school students to language puzzles from which they can learn about the richness, diversity and systematic nature of language, and develop their reasoning skills. The general value of this type of knowledge and skills in high school education has not been specifically articulated to potential participants or their teachers, schools or parents, as it has in the UK (UKLO, 2011; Hudson and Sheldon, 2013). However, informal feedback and the participation rate both indicate a widespread perception in the school sector that this type of activity has educational value, albeit with different focuses in different schools. For many of the schools that participate, OzCLO provides a means to meet their institutional responsibility to provide extra-curricular activities that are intellectually stimulating and broadening for academically high-achieving students (under rubrics such as 'gifted and talented'). Some schools offer OzCLO to a wider range of students.

The broader aim of OzCLO is to promote awareness of, and interest in linguistics and computational linguistics in high schools and in the wider community, and more specifically to increase enrolments in these disciplines at university level. A further goal is that this will ultimately attract people to careers in these areas. Linguistics has traditionally had little recognition at high school level in Australia, even within language education, although more recently there is linguistics content at upper high school level in the English Language course in Victoria and in the new national English curriculum. OzCLO has been running in most regions long enough to see participants reaching university, and although there has been no proper research on the impact of OzCLO on enrolments, there is anecdotal evidence that some former participants have chosen to study at least some linguistics.

Consistent with the key aim of promoting interest, OzCLO operates on the principles that participation should be fun and should offer achievable if challenging tasks to a wide range of students across science and humanities interests, especially in the First Round. Schools are provided with a training package of problems which starts with a simple morphological analysis that is suitable to do as a whole-class exercise even if they do not proceed to the competition itself. In both rounds participation takes place in school-based teams, rather than individual competition.

This is partly to encourage students to learn to communicate their analytical ideas, to collaborate effectively, and to provide mutual support and social interaction. It also offers some organisational advantages in terms of registration and marking. Because team members may have different levels of ability, the competition process does not necessarily identify the highest achieving individuals, but this risk is out-weighed by the benefits of teams. The organisation of the First Round as separate competitions in each region provides each team with a smaller pool to compete in initially and a distinct level of local achievement. However, since there are considerable differences in the number of teams in each region, and the top teams from each region are invited into the National Round, the national competition does not necessarily consist of the highest achieving teams nationally and there is currently discussion of methods to minimise this effect. Finally, the results are structured to recognise participation as well as high achievement: in addition to recognising the top teams, all teams receive certificates in the categories Gold (top ≈25%), Silver (next ≈25%) and Bronze (remainder).

3 Organising the Annual Competition

3.1 University level

All Australian states and territories (with the exception of Tasmania) now participate in OzCLO and there is typically one Local Organising Committee (LOC) for each geographical region. There are currently eight LOCs (soon to be nine with the addition of a third New South Wales region). Each LOC has the responsibility for student and school liaison, university space booking, recruiting volunteer academic and student helpers, running the competitions, publicising the event locally, and finding cash or in-kind sponsorship (e.g. for rooms, venues, printing and prizes).

The National Steering Committee (NSC) comprises the Chair of each LOC, the Problems Coordinator, the Treasurer, the OZCLO Webmaster and the Online Competition Coordinator. The NSC's role is to coordinate between LOCs, make and implement OzCLO decisions, and coordinate national sponsorships and publicity. A training package is developed by the NSC and provided online each year, on the OzCLO website and within the online competition site. The NSC Chair has the responsibility of ensuring the coordination and execution of tasks for OzCLO,

both nationally and internationally. The NSC Chair and the Problems Coordinator liaise with ELCLO (English Linguistics and Computational Linguistics Olympiads) with regard to developing annual problem sets, and with the International Linguistics Olympiad (ILO/IOL) with regard to the international competition. NSC members may have dual responsibilities.

Because of the distances between regional centres, the NSC meetings are all conducted via teleconferences, and committee members share documents and records using Airset, a cloud-based collaboration site.

3.2 School level

OzCLO operates on a democratic basis, with the devolution of decision making passing from NSC to LOC to school teacher to students. Teacher and student feedback often contributes to NSC discussions. Information is disseminated to school teachers through the website as well as through emails from the region's LOC. This information is also shared via Facebook and Twitter accounts. Training sessions are provided online, at universities and, in some cases, within schools. Teachers register teams of 4 members at the Junior (Years 9 and 10) or Senior level (Years 11-12) online. There is no limit to registrations for the online competition, but registrations for the offline competition (in which students typically attend the organising University campus) may be constrained by University venue availability issues. Some schools have Linguistics Clubs, and OzCLO is a strong focus for their activities. In some regions, schools with over 80 participating students request in-house training and invigilation for an offline First Round.

3.3 The public face of OzCLO

OzCLO has a website (www.ozclo.org.au) and a social media presence with Twitter and Facebook accounts for communications and promotion. Most LOCs have been successful in gaining publicity for OzCLO through their University media departments. Many schools publish pictures and items about OzCLO achievements in their school newsletters. Some individual schools have featured in the local press after results of competitions have been published. OzCLO has also featured in national radio segments.

4 The OzCLO Competition

4.1 Competitions Rounds

The OzCLO competition consists of two rounds, a regional or state-wide First Round and a National Round. In both, school-based teams of up to four students attempt to solve five or six linguistic problems in two hours. The teams are divided into Senior and Junior sections, with the Senior teams drawn from the last two years of high school (Tears 11 and 12) while the Junior teams are drawn from the two preceding years (Years 9 and 10). The same problems sets and competition conditions hold for both Senior and Junior teams. The top three teams from each LOC are invited to go on to the National Round which is held under the same conditions. If the top Junior team is not in the overall top three teams, then it is also invited. The Senior team which wins the National Round is invited to represent Australia at the ILO.

4.2 Problem sets

In its first two years, OzCLO greatly benefited from NACLO, which allowed use of their problem sets. Some additional problems were composed by linguists engaged in the running of the competition, or their colleagues. Since 2009, OzCLO has been part of ELCLO, the English Language Computational Linguistics Olympiad, in which participating countries (Australia, Ireland, North America and the United Kingdom) contribute to a shared set of problems. Because of the OzCLO rationale described above, an attempt is made to try to have a mix of problems based on data from a wide range of languages, and also a wide range of data types. Different levels of difficulty are included so that students have the satisfaction of being able to solve most of the problems. The aim is to show students that analysing language phenomena can be fun as well as challenging, and also that linguistic skills can be applied to some very practical tasks. The problems include: deciphering non-Roman scripts; translation tasks involving typical morphological and syntactic analysis; computational linguistic tasks; search for phonological rules, or linguistic reconstruction.

4.3 Training for ILO

Since 2009, an Australian team has participated in every ILO. While the main goal of OzCLO has always been the promotion of language studies, linguistic knowledge and analysis skills in

Australian high schools, the appeal of potentially participating in an international competition has proved an additional incentive for many of the students and their teachers. However, because of the rationale for OzCLO discussed above, the problems used in the First Round and even the National Round are not nearly as difficult as the actual ILO problems. Therefore the Australian team needs to be given additional training before competing at the international level. This training was first provided by a coach accompanying the team at the ILO but we have found that this was insufficient and too late to be helpful. We now provide training sessions aimed at solving ILO-level problems to the winning team prior to travelling to the ILO. This has resulted in higher results, including an individual silver medal in 2011 and honourable mentions in 2010 and 2012.

5   Participation 2008-2013

OzCLO has evolved from 22 schools and 119 competing students in 2008 to 87 schools and 1,451 competing students in 2013. Some schools have participated each year, and there has been a steady increase in new schools. Private and selective government schools have so far been the majority in most regions, but the numbers of government schools participating are growing. All participating schools are highly enthusiastic about the OzCLO competitions.

OzCLO naturally attracts schools keen on offering a new kind of challenge to students in their GATS (gifted and talented students) programmes. However, teachers (not only language teachers, but also mathematics and computer sciences teachers) also comment that OzCLO is a rare kind of competition because it provides fun, challenge, stimulation and team work for any student.

A challenge for Australia compared with Europe or North America is the enormous distance between rural and metropolitan areas, making it difficult for many schools in rural areas to participate in an offline University-based competition. The advent of the online option gives urban, rural and country remote students equity in access. Thanks to this plus a strong marketing drive in that state, numbers have increased dramatically in Queensland. In other regions, some schools prefer the university campus experience offered by the offline option.

As Table 1 shows, numbers have increased steadily over the six years since inception. In 2013, Australia's population of 23 million has provided nearly as many Linguistics Olympiads competitors as has the United States and Canada combined, whose population figures are fifteen times more than Australia's. The OzCLO participation rate is 6.4 per 100,000 population. For UKLO it is 4.55, and for NACLO 0.49.

6   Going on-line

In the first four years of OzCLO's existence, the competition was offered on campus by academic staff volunteers from a number of mainly metropolitan Universities. Participating teams travelled from their schools to the respective Universities' campuses to take part in the Training Session and the First Round, except for NSW, where several OzCLO representatives also travelled to schools with a large participation base, in order to run the competition at the school. Teachers often reported that these visits to the University campus were a highlight for the participating students who very much enjoyed the experience.

Nonetheless, a number of drawbacks to this approach became apparent quite early. These included:

- The difficulty of organising suitable venues on campus for running the competition due to the timing of the First Round (usually coinciding with Universities' Orientation Week or their first weeks of teaching in the first semester).

- The distance factor with the result that only schools within travel distance could participate in the competition (in the case of Queensland, for instance, no school beyond a distance of about 100kms from campus participated in the offline competition). Given the size of Australia, most regional and rural schools were thus virtually excluded from competing.

- Constraints on availability of venues and markers put a cap on the overall number of students who could compete in each region. Thus, the number of schools and the number of students per school had to be limited by the local committees from the outset (e.g. in Queensland, only two teams per school were able to compete, although some schools wished to enrol many more).

LOC	2008 Schools/ students	2009 Schools/ Students	2010 Schools/ students	2011 Schools/ students	2012 Schools/ students	2013 Schools/ students	Region population 000s	Participants per 100,000 population
NSW-S	10 / 64	14 / 105	[fn/a] / 92	15 / 279	12 / 289	9 / 312	7,314	5.24
NSW-N	n/a	n/a	5 / 40	7 / 58	5 / 60	6 / 71		
VIC	12 / 55	11 / 90	[fn/a] / 120	9 / 115	16 / 245	18 / 304	5,649	5.38
ACT	n/a	7 / 30	5 / 83	5 / 72	9 / 136	9 / 161	377	42.76
QLD	n/a	11 / 60	15 / 90	15 / 106	20 / 312	25 / 377	4,585	8.22
SA	n/a	[fn/a] / 29	5 / 33	3 / 19	4 / 27	3 / 34	1,658	2.05
NT	n/a	n/a	n/a	n/a	n/a	6 / 80	236	33.86
WA	n/a	10 / 78	11 / 144	16 / 143	14 / 120	12 / 120	2,451	4.90
TAS	n/a	n/a	n/a	n/a	n/a	n/a	512	0
Overall	119 students	392 students	602 students	792 students	1069 students	1459 students	22,786	6.40

Table 1: Participation schools/students
(n/a = not applicable = LOC was not participating; [fn/a] =figure not available

In order to address these issues, it was decided to offer an online option in 2012, using Griffith University's Learning Management System. This lifted restrictions on numbers (both school and students per school), and schools were able to compete from anywhere in Australia if they so wished. As a result, schools located as far as 1,500 kms from the metropolitan areas have successfully participated in the competition, and some schools registered more than 20 teams in the latest competition. With the online option, the overall number of participants has increased dramatically (see Table 2). For instance, Victoria saw the number of their participants double from 2011 to 2012, while numbers in Queensland nearly tripled. Even in those regions that shifted to exclusively offering the online option (such as Queensland in the last two years), most schools have remained in the competition.

	2012		2013	
LOC	Online students	On campus students	Online Students	On-campus Students
NSW-S	91	198	120	192
NSW-N	60	[on/a]	8	63
VIC	137	108	195	109
ACT	64	72	115	46
QLD	312	[on/a]	377	on/a
SA	0	27	34	on/a
WA	28	92	120	on/a
NT	n/a	n/a	80	on/a

Table 2: Participation numbers by mode (online/on-campus)
(n/a = not applicable (LOC was not participating); [fn/a] =figure not available;
[on/a] =option not available)

In terms of students competing online vs. on-campus, except for the NSW-N region, there is a distinct shift towards participating online. Feedback from teachers has shown that in many cases it is easier for teams to stay within the school grounds for the competition rather than to travel to the University campus. For some schools, however, travelling to the University campus is still one of the major benefits they would not want to lose. For this reason most LOCs offer both on-campus and online options. Some regions choose to only offer the online option (with a training session at the University).

Teams participating online have access to training materials and all the necessary information, which is made available through the OzCLO website well before the competition day. This site also allows teams to familiarise themselves with the online testing system. On the day, all teams across Australia compete at the same time on the same day and within the same two hour period (to compensate for time zone differences, teams started at 12:00 in WA, 13:30 in the NT, 14:00 in QLD, 14:30pm in SA and 15:00 in the ACT, NSW and VIC in the 2013 competition).

In terms of process and technical requirements, each participating team needs access to an Internet-enabled computer on the day of the competition. No special software is required on the school's computers. The problem set is made available to teachers shortly before the competition commences, in order to allow them to print and copy the problems for the students. Students usually work on the paper copy, and then access the computer to enter their responses. There is also a virtual classroom set up for live communication during the competition, in order to allow students and teachers to ask questions but also to show students that there are hundreds of competitors participating from around the country at the same time.

Overall, the addition of the online alternative has been a very beneficial development for OzCLO. The strong growth in overall participant numbers over recent years is not simply due to the online option, but this has certainly played a major role. It remains to be seen if there is even more potential for growth – especially in areas outside of the major cities.

7 Challenges

One of the main challenges OzCLO faces is the timing of the competition in relation to the schedule of the international linguistics competitions. The Australian school year begins in February and ends in December, and the university year is roughly March to November, in contrast to the September-June academic calendars of the northern hemisphere. In order for an Australian team to be selected with enough time to prepare for participation in the ILO, the National Round needs to be held before the Easter break (March/April). For Universities and schools, this creates a very rushed timeline at the busiest time of the school/academic year.

As mentioned earlier, another challenge for Australia is the vast distances between metropolitan areas, where most of the universities are located. In spite of the success of the online competition, so far OzCLO has had mostly a metropolitan base and has not yet fully engaged in marketing to regional and rural areas across the whole country. Targeting appropriate teachers within schools can also be a challenge, as experience has shown that often the information does not filter through to the relevant teachers (these are usually the coordinators of Languages, Gifted Education, Mathematics, or Computing programmes). Contacting the professional associations for the different teaching specialties could ensure that information is disseminated more efficiently.

Funding is not guaranteed, and fundraising efforts are not rewarded every year. All organisational efforts at University and school level depend on good-will and volunteering as well as donations. Changes in Heads of Departments in Universities and principals in schools can impact negatively on funds and participation levels. This means that core issues need to be resolved again every year, for example, the ongoing maintenance of the OzCLO website/online registration system, which is both a challenge and a solution to other issues. The OzCLO website hosting is provided by Macquarie University and the site is maintained by a student volunteer. It has served as the central hub of information, with other modes (email, Facebook and Twitter) leading back to it for detailed information. In addition to ordinary information, it also enables self-service registration, and the automated generation of PDF certificates after the competition. These facilities and the volunteer support of the webmaster

have significantly lowered the administrative and financial overhead for the organisers.

An additional problem for OzCLO is the division of Australia's most populated state (NSW, with almost a third of Australia's population) into northern and southern regions, which leads to one state providing double the competitors of other states into the National Round. A model is needed whereby all competitors, no matter whether they come from a small or a large region, have an equal opportunity to compete in the National Round.

Finally, while OzCLO has been able to contribute a number of linguistic problems to the ELCLO pool, it has proved extremely difficult to obtain contributions from Computational Linguistics (Estival, 2011).

8   Conclusions

In conclusion, running the OzCLO competition has been an activity well worth the effort, and it is very rewarding that it has become a fixture in the academic calendar for many schools. Students, teachers and principals have been extremely positive about the experience, giving encouraging feedback and expressing strong support for the competition. The recent increases in participation rates have come from new regions (only one Australian state currently has no LOC, but possibilities are being explored in this area), new schools, and larger numbers from individual schools (up to 100 participants from a single school). Some schools have started a linguistics club as after school activity, and others are promoting their experiences on social media.

While there is no data currently available regarding any effect on enrolments in tertiary linguistics programs, increased interest in and awareness of linguistics is certainly a positive outcome for a discipline which faces challenges of funding and viability. The cooperation of academics from universities across the country in all the LOCs and the NSC, plus the support of the Australian Linguistics Society (ALS) and of the Australasian Language Technology Association (ALTA), make the competition a truly national event. This means that the competition is not dependent on any one single person or institution (although competition within particular regions is), and allows for further growth. Ongoing funding and continued support from both universities and schools across the country should see continued growth in the popularity and spread of the competition.

References

Derzhanski, Ivan, and Thomas Payne. (2010). The linguistic olympiads: academic competitions in linguistics for secondary school students. *Linguistics at school: language awareness in primary and secondary education*, ed. By Kristin Denham and Anne Lobeck, 213–26. Cambridge: Cambridge University Press.

Estival, Dominique. (2011). "OzCLO: The Australian Computational Linguistic Olympiad". Proceedings of the Australasian Language Technology Association Workshop 2011. Canberra, Australia.

Hudson, Richard, and Sheldon, Neil. (2013). "Linguistics at School: The UK Linguistics Olympiad." *Language and Linguistics pass*, Volume 7, Issue 2. pp. 91–104,

Radev, Dragomir R., Lori S. Levin, and Thomas E. Payne. (2008). "The North American Computational Linguistics Olympiad (NACLO)". In Proceedings of The Third Workshop on Issues in Teaching Computational Linguistics, Columbus, OH, USA.

Simpson, Jane, and Henderson, John. (2010). Australian Computational and Linguistics Olympiad. Cross Section, Vol. 20, No. 3, July 2010: 10-14.

United Kingdom Linguistics Olympiad Committee. (n.d.) The Linguistics Olympiads: Lots of fun, but are they educational? http://www.uklo.org/?page_id=35.