Summary of Cell Phone Situation at IOI`24

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Introduction

This document aims to clarify some aspects of the cell phone situation at the 2024 International Olympiad in Informatics. The official versions communicated to the Team Leaders (GA), is:
- CHN03 was found with a cellphone that was on, during the contest.
- After the contest, off cellphones were found in bags of CHN01 and CHN02.

The result was that CHN03's score was set to 0, and CHN01/CHN02's day 2 scores were halved, all under the category of rule violation.

After these events became more known, I saw much discussion regarding the situation. The following to me seemed particularly important:

1. Why were phones found on CHN01 & CHN02, and why only their bags.
2. How did the rule violation (with bags as well as cellphones) happen.
3. What was CHN03 doing with the cell phone.

As I have served on the ISC before in 2015 - 2018, and was also involved with Egyptian team training in 2022 and 2023, I asked some previous contacts about this situation, including:
- the IOI'24 host chair, Eslam Wageed,
- the current chair of the IOI International Technical Committee (ITC), Martin Mares,
- the chair of the IOI'24 International Scientific Committee (ISC), Ali Sharifi Zarchi.

Below are some details regarding these three points compiled based on conversations with them, as well as the post-contest reports by all 4 CHN contestants, available at https://noi.cn/jlfx/. My own opinions are then at the end of this document.

Some Additional Data

1. The situation with Phones on CHN01 and CHN02

One surprisingly little known fact, especially among organizations that consistently do well at the IOI, is that CHN does not have a nationally organized training camp. Instead, technical knowledge is completely decentralized, contestants prepare mostly using their schools' resources, and the national program functions almost entirely for selection. Since 2022, there have been some rounds of 3-4 days onsite training (e.g. https://qoj.ac/contest/1729), but these mostly serve as a way for the schools to run camps. The CHN contestants' school coaches are present at the IOI, and serve as the main point of technical communication/advice.

The timeline of the situation on IOI`24 day 2 is roughly:
* After a contest hall volunteer noticed the phone on CHN03, they notified an ISC member who was on the contest floor.
* The cellphone was confiscated from the student, while the ISC chair (Ali) was informed and went to the contest floor.
* After this action, no further interactions with contestants happened until the end of the contest: during this process, the CHN leader was contacted. (the time stamps by chat logs indicate a text message 45 minutes before the end of the competition)
* However, the leader did not arrive at the hall until the end of the competition.

Discussions with CHN happened after the contest ended, after all contestants left the hall. Communications happened entirely in the presence of the leader, but first after a fairly lengthy communication between the CHN leader and CHN03. At some point the question of how the cellphones were brought into the contest hall was brought up, and 2 of the CHN contestants mentioned that they asked contest hall guides, and were told it was ok. At this point those two contestants opened their bags and took out the phones.

The head of the ISC then communicated the entirety of the situation to the organizing body, the IOI International Committee (IC). The decision of the 50% points deduction was decided on entirely by the IC, then informed to the GA.

2. Rule violations

As someone who has helped run IOI contests, the first item that was highly puzzling to me is how did bags get onto the contest floor. The IOI rules, posted at https://www.ioi2024.eg/contest-rules, state that:

> Bringing items with the exception of clothing, jewelry, and ID badge into the competition room requires prior approval from the Technical Committee. A contestant must submit these items by leaving them in a designated container

followed by (after details on how to submit these items):

> Any attempts to bring any other items unlisted above into the competition rooms are considered cheating.

As AAST, the school that ran the IOI, also ran the ICPC WF22/23 back in April, there was an overlap in resources for both events. So many IOI specific rules were not followed.

Here it is useful to explain the quarantine process at IOI, which differs from many other olympiads. IOI problems due to their length, require lengthy translations that often last the night until the start of the contest. During this time, the contestants are completely separated from leaders, and are entirely under the supervision of the team guides. In particular, there is no analogs of the IMO deputy leader, who is with students the entire time.

In previous IOIs such as 2019, where phones were removed from students at the start of the qurantine.In 2024, there was no monitoring/restricting of electronic communications during this time at all. This plus extensive delays in all activities made it very appealing for students to pass time with phones. In events such as the CNOI, there are also bag deposits at the front of the hall. Team guides can also serve as collection points of the bags.

According to the ITC chair (Martin), on Day 2 there was a massive miscommunication with the contest hall volunteers. Due to delays caused by entering the hall on Day 1, new instructions were given to the contest hall volunteers, which got interpreted as letting everything into the contest hall. I actually looked through the contest live stream on day 2, and found two bags on the contest floor along the part of the aisle visible to the camera. Martin and my guesses are both that the number of bags on the contest floor on Day 2 are in the 10s, but definitely not in the 100s: this is also supported by my discussions with Canadian contestants.

As it turned out, even on Day 1, with the initial checking of items at the door, the entire CHN team's bags were on the contest floor. Two CHN team members stated that they asked volunteers, and were told to take bags in. One thought it was strange, so actually placed his bag in a corner of the hall.

CHN02:

在现场志愿者提出了没有统一存包处可以将书包放到我脚下时，我也没有冷静下来处理，而是抱着"多一事不如少一事"的心态选择了听从志愿者的建议。

Zài xiànchǎng zhìyuàn zhě tíchūle méiyǒu tǒngyī cún bāo chù kěyǐ jiāng shūbāo fàng dào wǒ jiǎoxià shí, wǒ yě méiyǒu lěngjìng xiàlái chǔlǐ, ér shì bàozhe "duō

When the volunteers on site pointed out that there was no unified bag storage area and that I could put my bag at my feet, I did not calm down and deal with it. Instead, I chose to follow the volunteers' advice with the mentality of "less trouble is worse than more trouble".

CHN03:

Day 1 的那天早上，我们被通知 8:00就到比赛场地，结果在场地外面等了很久，直到 8:30 才进场，这也是埃及做事风格的一种体现吧。

我们问了志愿者包应该放在哪里，得到的回复是"可以带进去放座位旁边"，于是我们就这样做了。

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Day 1 dì nèitiān zǎoshang, wǒmen bèi tōngzhī 8:00 Jiù dào bǐsài chǎngdì, jiéguǒ zài chǎngdì wàimiàn děngle hěnjiǔ, zhídào 8:30 Cái jìn chǎng, zhè yěshì āijí zuòshì fēnggé de yī zhǒng tǐxiàn ba. Wǒmen
Show more

On the morning of Day 1, we were notified to arrive at the competition venue at 8:00, but we waited outside the venue for a long time and did not enter until 8:30. This is also a reflection of the Egyptian style of doing things.

We asked the volunteers where we should put the bags, and the answer we got was "You can bring them in and put them next to your seat", so we did it.

When this (and subsequent interactions on Day 2) was brought to the attention of the ISC, ISC asked the head contest hall volunteer, who denied giving such instructions to the volunteers. An attempt was made to ask the CHN students to find which volunteer they talked to, but they could not identify.

The cellphone situation was considered more serious because there is an explicit ban in contest rules for communication devices, which is not the case for the bag. The `any attempts to bring items unlisted above is considered cheating' is followed by:

Any attempts to bring any other items unlisted above into the competition rooms are considered cheating. In particular, the following items are strictly prohibited on the competitions:
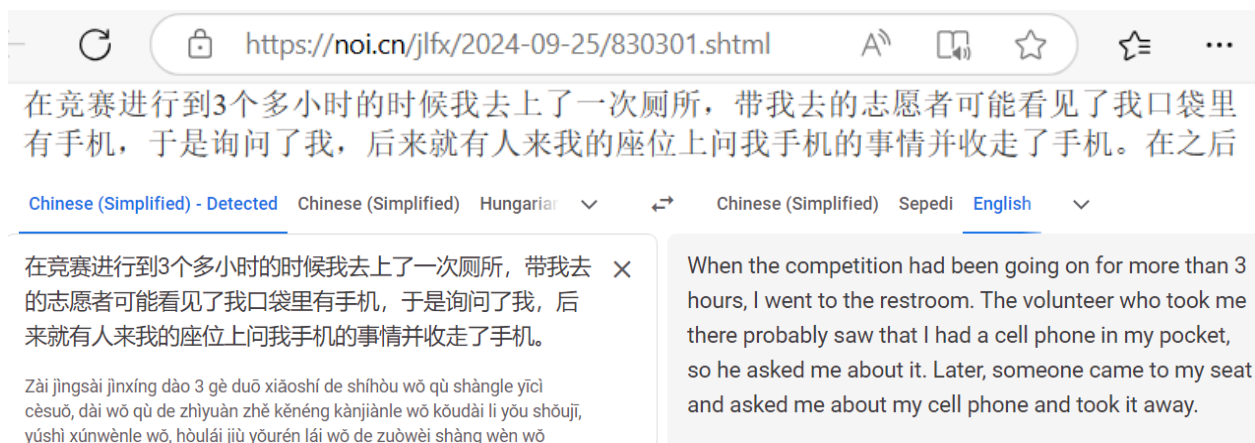
- any computing equipment (e.g. calculators, laptops, tablets),
- any keyboards or mice, with wireless communication or programmable functions whose configuration is retained when unplugged,
- any books, manuals, written or printed materials,
- any data storage medium (e.g., CD-ROMs, USB drives, flash cards, micro-drives),
- any communication devices (e.g., mobile phones, radios of any sort, Bluetooth-enabled devices),

The guide for the CHN team states that he mentioned to the team that cellphones cannot be brought into the contest.

Because the discussion with CHN happened after the competition ended, after all contestants had left, there was no attempt to check other bags on the contest floor, or what was in them.

3. CHN03 and cell phone

The time that the phone was found was about 200 minutes into the competition. According to the contest hall volunteer, CHN03 was asked whether the object in pocket was a cellphone, and replied no. The hall volunteer then decided to further discuss with ISC, which is how the whole thing started. This is confirmed by CHN03's report.

A general consensus among current/former contestants is that the most likely motive for bringing the phone to the bathroom is to check the competition scoreboard. Unlike ICPC, scores of others at IOI are not visible to the person competing, but to everyone outside the competition.

IOI tasks also have partial scores. In 2024, the task difficulties were easy (P1), easy/medium (P5), medium/hard (P6), medium/hard (P2), hard (P3), extremely hard (P4). This resulted in ranks 10 - 150 (mid gold all the way to high bronze) being completely decided by partial scores. So any info about difficulties of the (sub)tasks can indeed greatly aid the decision making process of the contestant.

In particular, a typical contest experience on IOI24 Day2 is that after solving P5, contestants are faced with choices between a seemingly approachable P4, and a lengthy P6 whose full score hinges upon removing a factor of 2 (in fact 2 out of the 3 solvers for P4 only got 64/100 on P6 due to this factor of 2). The most common score on the subtasks of P4 were 3/100, which is also extremely unusual for past IOI standards. This is a situation that can easily overload the decision making process of the contestant, and is one where information about how others are doing can be enormously beneficial.

Furthermore, over the past two years, it has been increasingly common for high school students in China to participate in ICPC contests, which do have live scoreboards until the last hour. So I can also imagine contestants developing the habit of using scoreboards to aid decision making.

For better or worse, many of the questions related to this situation now are related to reputation. As someone in touch with the Chinese programming competition scene, I believe it is useful to

state that the school organization that CHN03 is from has been involved in the following contest related incidents:

* About 10 years ago, a student who trained at that school taking part in USACO used two accounts during a Codeforces competition, and was asked by Mike Mirzayanov to make an apology post.
* In 2016, the school directly sent a delegation to IOI asking to host IOI, without first clearing things through the Chinese National Program.
* In 2024, CHN04 (also from this school) had his main ID banned from Codeforces for using duplicate handles.
* Since 2022, resources from this school are now directly tied in with the X-camp contest training program in the US, which is a for-profit programming competitions training program.

Over the course of summer 2024, this organization produced a significant amount of coverage of their two students on the CHN team, as well as the student from X-Camp taking part in the IOI, in part to promote their training resources. They also set up a live stream outside of the IOI`24 contest, analogous to ICPCLive.

Opinions

The facts stop here. The rest are Richard's opinions.

Firstval, I believe the performances of CHN01, CHN02, and CHN04 on IOI24 are unquestionable. That's my primary motivation for writing this document.

My own involvement with IOI (HSC 08 - 10, ISC 15 - 18), as well as overall trajectory in some sense, has much to do with a situation at IOI`06 that went way beyond my own control. The trend of blaming organizational issues onto the contestants was repeated throughout this situation. So this whole situation hits very close to home to me.

The situation with CHN03.

From first hearing about the phone, I have always believed that the most important information is when the phone was found.

This incident actually resolved a few trends of thoughts/ going back to when I was more closely involved with coaching. Specifically whether I was too harsh when influencing decisions based on track records and reputations. When my PhD student, Jingbang Chen, who helped with ZheJiang provincial selections and served as deputy leader for Egypt2 at IOI24, first mentioned what happened to me with the remark that it felt very strange, my reply was "I don't feel strange at all, inform the teacher of the school (who was also onsite at IOI`24) that I said this."

For those in/around CNOI circles, it may be useful to reconsider a belief that has been popular for the past 20 years, which is "anyone taking CHN Team Selections can easily get IOI gold". IOI`24 was not such a contest: fewer than 10 competitors (out of >300) fully solved half of the problems. In my observations of contestants, especially highly trained ones, such deviations from expected 'normal' is one of the quickest routes to strange actions.

Furthermore, the spectator sport nature of modern IOIs, specifically, the live black-box feedback, no scoreboard, and being watched by online communities, all add psychological strains on the participants. While there definitely still exist contestants that thrive in such environments, it's no longer a fun experience for most involved. This trend I have experienced as a contestant, a coach, and an organizer, and should be able to simulate for most people interested in understanding it better.

About cheating / rule breaking

I was involved with a lot of discussion about this incident over the past 2 months. Two major points where I differ significantly from others are:

Disagreement 1: are rules all-or-nothing. In my experience, with the broad reach of contests and the power of modern technology, as soon as there is an impression that the rules are flexible, any semblance of fairness breaks down. At the International Math Olympiad (IMO), teams have openly accused other teams of cheating at the closing meeting, due to such impressions.

This interpretation places a great deal of emphasis on those enforcing the rules, because consistency between enforcers is extremely important.

My own belief is that as soon as bags were allowed on the contest floor (as evidenced by the LiveStream screenshots), all items related restrictions became invalid. I am particularly disappointed at the lack of inventory of banned items on the contest floor upon finding the phone and bags: not doing so demonstrates a lack of rule awareness by many parties.

Disagreement 2: how common is cheating/rule-breaking. My own contest experiences in China, Canada, and the United States indicate that under the correct combination of incentives, instructions, and opportunities, infractions happen almost deterministically. Furthermore, this is actually more prevalent in organizations with long participation track records, especially those that have produced international competition winners.

I believe for a more accurate model of cheating, we should treat what happens in online competitions (e.g. Codeforces) as the norm. The situation with duplicate ids, communication between contestants, and proxy test taking is something that organizers need to come to terms with, and actively discuss with participants to dissuade.

Here I would like to restate my long-time belief that in-person proctored tests are the only certifiable results. This is especially relevant to the current competition environment in the US and Canada, where preparations are becoming increasingly globalized (see end of the additional data section).

Responsibility

First and foremost, the responsibility to learn and follow the rules are on the contestants, and even more so on the team staff. Communication barriers mean that the team staff are fundamentally responsible for all interactions. I feel this situation, starting from the 45 minutes of delay in responding to the text, was severely mis-handled by the CHN team.

My belief is that, somewhat ironically, the lack of long-term optimization for competition performances by the CHN organization is the root cause to what transpired. The CNOI organization has always taken a stance of having as many students experience the IOI as possible, and focus more on the development of the participants. However, in some situations such as this one, the organization is still judged as a whole, as evidenced by the spread of the score reductions.

On the flip side, the IOI is almost unique among the Olympiads in its very long time period of leaders/contestants separation. During this time, any actions by volunteers have significant impacts on the contestants. Past IOIs such as 2010 in Waterloo involved long orientations of the volunteers for this reason. Failing that, the fact that there are no returning contestants on CHN to notice and protest the abnormalities was a disadvantage almost unique to them: returning CHN gold medalists have been ineligible since 2006. To address this, it may be useful for IOI to create roles similar to the IMO deputy leader: coaches/guests designated to be with the contestants at all times, instead of participating in the problem vetting / translation processes.