



## Plagiarism in game programming competitions



H.J. van den Herik<sup>a</sup>, A. Plaat<sup>b,\*</sup>, D.N.L. Levy<sup>c</sup>, D. Dimov<sup>d</sup>

<sup>a</sup> Leiden Centre of Data Science, Leiden University, Leiden, The Netherlands

<sup>b</sup> TiCC, Tilburg University, Tilburg, The Netherlands

<sup>c</sup> 34, Courthope Road, Hampstead, London NW3 2LD, United Kingdom

<sup>d</sup> eLaw@Leiden, Leiden University, Leiden, The Netherlands

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### ABSTRACT

On June 28, 2011 the International Computer Games Association (ICGA) disqualified and banned the program RYBKA and its programmer Vasik Rajlich from previous and future World Computer Chess Championships (WCCC). The ICGA had conducted an investigation into allegations that, in the chess program RYBKA, two other programs were plagiarized: CRAFTY and FRUIT. It was found that the allegations were true, and that the ICGA tournament rules had been broken. The investigation, the report of the investigation, and the verdict that Rajlich was guilty of the plagiarism took place in the form of a version of Crowdsourced Online Dispute Resolution (CODR). The above sentence was determined by the Board of the ICGA. This article describes, amongst other things, the background, the ICGA rules, the rules for fair play in competitions, CODR, and the future of clones. Finally, in the conclusions, the question is addressed whether the application of the ICGA rules has been fair and lawful.

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### 1. The ICGA community

The ICCA (International Computer Chess Association) was founded in 1977 and represents the Computer Chess world vis-à-vis Computer Science Organizations, such as the ACM and IFIP, and also vis-à-vis the International Chess Federation (FIDE). In 2002 the name of the Association was changed to the International Computer Games Association (ICGA), thus incorporating the International Computer Chess Association (ICCA). In the same way the ICGA also represents the Computer Games world vis-à-vis the various international federations for games other than chess.

Two of the main activities of the ICGA are: (1) to publish a quarterly *ICGA Journal*, and (2) to hold regular World Computer Chess Championships, Computer Olympiads, and either an Advances in Computer Games Conference (ACG) or a Conference on Computers and Games (CG).

### 2. The desire to win

The differences between running, swimming, cycling, chess, and computer chess are substantial. For instance, we may distinguish here three classes: sports, mind sports, and computer games. How-

ever, a similarity is that the participants in all three classes aim to win. Some participants aim to win no matter what price is paid. This attitude is debatable and in its extreme even punishable. Here, the natural question is: when does a participant cross the line? Trying to win a competition is a very human emotion. In many sports the winner is considered a hero. Each community loves their heroes and hates the people that take the heroes away from them. Recently, two international organizations, the ICGA and the USADA (United States Anti-Doping Agency) disqualified their hero after a thorough investigation. The USADA has taken Lance Armstrong away from his community and has thus removed the joy of many cycling enthusiasts from their sport. The ICGA did the same with their hero Vasik Rajlich, whose program RYBKA has won four World Computer Chess Championship titles. Being disappointed on the disqualification of a hero follows a line of reasoning which is familiar to all of us. The ordinary man does not like to pay speeding tickets given by a police officer, and do we not all, in some way, love Captain Jack Sparrow (the Caribbean pirate), who outsmarts the English governors of the law?

In summary, all sport communities where there is a desire to win are facing similar problems. The prevailing question is: how to deal with competitors who do not play according to the rules?

### 3. The relations among research, competition, and commerce

The relations among research, competition, and commerce are complex and full of contradictions. At first blush there appears to

\* Corresponding author. Tel.: +31 71 5277045.

E-mail addresses: [jaapvandenherik@gmail.com](mailto:jaapvandenherik@gmail.com) (H.J. van den Herik), [aske.plaat@gmail.com](mailto:aske.plaat@gmail.com) (A. Plaat), [davidlevylondon@yahoo.com](mailto:davidlevylondon@yahoo.com) (D.N.L. Levy), [dwdimov@abv.bg](mailto:dwdimov@abv.bg) (D. Dimov).

be a straightforward regulated development from research to commerce. For instance, scientific research is seen by many as an attempt to find the ultimate truth in an intricate question. Competition arises when many research groups are aiming to find the answer. Once a solution has been found it may be of interest for commerce. However, the interests of research and commerce sometimes conflict. Research and commerce meet now and then when their representatives are involved in a contest, in this article, the world computer chess championship (WCCC). Some of the ideas expressed below are adopted from van den Herik [16]. They were then observations and expectations. Now they serve as pointers as to how to deal with the consequences.

Competitiveness in research can be tough, very tough, but the focus typically is on honor, whereas in commerce the focus of competitiveness is on money and the competitors mostly search for the boundaries of what is legally permitted. Obviously university professors and businessmen live in different worlds. Now and then they meet; for instance, during conferences with product demonstrations (especially in the medical domains), or at the WCCC, where amateurs play for fun and honor while professionals compete for position and money. Obviously, a competition is needed to establish the best program within a given domain, and for such a contest the rules should be spelled out.

It is not always easy to ensure that amateurs and professionals are univocal on the rules to be followed. There are many obstacles, and although everybody wishes to arrive at a solution, opinions can diverge considerably. In the past an ICCA community, moderated by Bruce Moreland, had an online discussion about (1) openings books (should the book authors be classed as team-mates?), (2) multiple entrants (can the same person simultaneously be a member of two or more teams? This is particularly difficult in relation to the discussion on the opening book), (3) cloned programs (when is a program a cloned copy of an existing program?) and (4) professional interfaces (who is allowed to use ChessBase's dedicated user interface functions (cf. [16])).

In supporting software, research and commerce meet again. For instance, what is the precise position of the results of the endgame tablebases? Apparently, they are seen as solved puzzles, and therefore they are fundamentally different from the opening books. More related to the current RYBKA case is the question: how do we deal with the alpha-beta algorithm? The algorithm is not patented and all programmers may make free use of it. Over the years we have seen an impressive list of researchers. All of them have contributed in one or another way. Who should be credited for these contributions? The area is grey and full of untrodden paths, which are a challenge for the businessman and the researcher alike.

A key element in this respect is how intellectual property is treated. Scientists typically favor publication and free access to ideas, whereas commerce often chooses to protect ideas through patents or other means. In Section 12 we discuss the related issue of open source licences.

#### 4. Fair rules for competition

For the World Computer Chess Championships the tournament rules are published in the ICGA Journal (e.g., [39]). For the 19th WCCC they were published on the website as well. In these rules we find Tournament Rule 2:

*“Each program must be the original work of the entering developers. Programming teams whose code is derived from or including game-playing code written by others must name all other authors, or the source of such code, in the details of their submission form. Programs which are discovered to be close derivatives of others (e.g., by playing nearly all moves the same), may be declared*

*invalid by the Tournament Director after seeking expert advice. For this purpose a listing of all game-related code running on the system must be available on demand to the Tournament Director.”*

There are nine rules for each specific tournament, and eleven general rules (see [39]). The rules are a convergent set of ideas developed over more than thirty years of which the purpose is to express lawfulness and fairness. The established ideas are the norms of a community and they are valid as such for each participant who signs up for a WCCC organized by the ICGA.

Tournament Rule 2 is key to prevent plagiarism, and has been part of the Tournament Rules since the start of the World Computer Chess Championships. It should be noted that the word “derivatives” and its parenthetical clarification are an important element of this rule. In Section 9 we discuss progress in machine learning, which makes the definition of “derivative” even more challenging.

Currently, the Rule is reformulated as follows [40]:

*“Each program must be the original work of the entering developers, possibly with the inclusion of game playing code and/or data from other sources for which the entering developers have a legal right of use. Developers whose code is derived from or includes (1) game-playing code; and/or (2) data written by others, must name (a) all the other developers of whom they are aware; and (b) the source of such code and/or data, in their tournament registration details.*

*Programs which are discovered to be undeclared derivatives of others may be designated invalid by the Tournament Director if he is convinced, after seeking advice if he feels that to be necessary, that the closeness of derivation is of such a level as to constitute unfair competition. A listing and an executable version of all game-related code and data running on the system must be available on demand to the Tournament Director prior to the start of and during the tournament. The Tournament Director has the right to submit the executable version of a program for testing for similarity with other known programs, and/or to submit the listing to an expert or experts of his choosing for examination, also to determine similarity. Under all circumstances the Tournament Director will take all reasonable steps to ensure that any such listing and/or executable are treated as being strictly confidential.*

*The entering developers must keep a copy of the source code of their entry until at least one year following the date of conclusion of the tournament, in order to be able to respond accurately to any questions about the source code that might be raised after the event by the Tournament Director.”*

#### 5. Three previous disqualifications

The disqualification of RYBKA was not the first incident of disqualification for the ICGA. Disregarding minor incidents, where the disqualification took place in the submitting and accepting phase, the ICGA has experienced three notable disqualifications. We briefly describe them below (see also [17]).

- (A) In the 9th World Microcomputer Chess Championship (Portorož 1989), the program QUICKSTEP, was excluded from further participation after four rounds. The reason was that the program was “an unauthorized version of the MEPHISTO ALMERIA program” [24,18].
- (B) In the 11th WCCC (Graz 2003) the author of the program List refused inspection of his program code and was banned from the tournament for precisely that reason [4].
- (C) In the 14th WCCC (Turin 2006) the program Lion++ 1.5 was excluded from further participation after four rounds. The reason was that their work could not be characterized as

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