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A Gross Miscarriage of Justice in Computer Chess

by Dr. Søren Riis

SUMMARY VERSION

Introduction

In June 2011 it was widely reported in the global media that the International Computer Games Association (ICGA), headed by Dr. David Levy, had found chess programmer Vasik Rajlich in breach of the ICGA's annual World Computer Chess Championship (WCCC) tournament rule related to program originality. In the ICGA's accompanying report it was asserted that Rajlich's chess program Rybka contained "plagiarized" code from Fruit, a program authored by Fabien Letouzey of France.

Rajlich, who cruised to victory in four consecutive WCCC tournaments in 2007, 2008, 2009 and 2010, was retroactively stripped of all titles he had won in competition and was slapped with a lifetime ban.

In response, Rajlich claimed complete innocence and made it clear that he found the ICGA's investigatory process and conclusions to be biased and unprofessional, and the charges baseless and unworthy. He refused to be drawn into a protracted dispute with his accusers or mount a comprehensive defense.

History

On December 4, 2005 a free, downloadable chess program named Rybka 1.0 Beta was initially released and took a sizable lead on all then-existing chess program strength ranking lists, surpassing all commercial programs. Rybka then proceeded to rapidly widen its lead with subsequent versions. Rybka went on to become a commercial engine in 2006.

Working with Grandmaster Larry Kaufman, one of the world's leading position evaluation specialists, Rajlich issued the seminal Rybka 3 in 2008. Rybka 3 was over 100 Elo points stronger than Rybka 2, an enormous improvement in what was already the leading commercial program. The latest public edition of Rybka (Rybka 4.1) is more than 300 Elo points stronger than the top competitors that existed in late 2005 on comparable hardware.

The ICGA's investigation and outcome

In early 2011 sixteen chess programmers, many of whose programs were direct competitors of Rybka, signed a letter wherein they asserted that Rajlich copied programming code from another engine, Fruit, authored by Fabien Letouzey and released to the public in June 2005, about six months before Rybka 1.0 Beta. They requested that the ICGA investigate their charges and, implicitly, take punitive action on the grounds that Rajlich had violated WCCC tournament rules. At this point over five years had elapsed since the alleged offense, and four consecutive world computer chess championships had been decisively won in head-to-head competition by Rybka.

In response to the accusing letter the ICGA formed a committee consisting of 34 experts, some with genuinely distinguished CVs, for their investigation. Judging from the Wiki which they used during their investigation, approximately seven of these 34 experts actively participated in the discussions. Three of the experts wrote a report wherein they argued that Rybka 1.0 Beta had plagiarized large parts of Fruit. None of the actual Rybka versions that participated in the four WCCC tournaments were investigated, although a very close version (Rybka 2.3.2a) was examined following a laborious process of reverse-engineering.

The ICGA committee found that Rybka 1.0 Beta had violated Rule 2 of the ICGA-organized WCCC, and published [extensive findings](#) in support of its action. Rule 2 reads as follows:

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 their submission details. 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.

It is argued within the paper that this rule is vague on key points and become obsolete for several reasons, and that the overarching reason it has passed into obsolescence is that there has been a paradigm shift in computer chess programming in the past decade which the rule does not take into account.

Technical disagreements

The paper takes the ICGA investigatory panel's technical findings to task on a number of grounds, relying on the research of veteran chess programmers Ed Schröder (Netherlands), Sven Schüle (Germany), Chris Whittington (Britain) and Dr. Miguel Ballicora (United States). It also draws from exclusive remarks and materials provided

to the author by Vasik Rajlich himself which serve to illuminate various points of contention.

Among the main points argued:

- The ICGA's conclusion that Rybka's evaluation function is so similar to Fruit's that it constitutes code-copying is demonstrably false. The paper points out ten material ways the evaluation is different, and provides proof that Rajlich was working independently on evaluation concepts over a year before Rybka 1.0 Beta was released.
- The ICGA's conclusion that Rybka shares a high degree of "evaluation feature overlap" with Fruit is irrelevant, because this overlap is at the conceptual, algorithmic level rather than the source code level—a similarity that is allowed in chess programming. Additionally there are methodological problems with the findings, and questions regarding the merit of the interpretations made.
- One example of the ICGA's "proof" of code-copying amounts to a dispute about one keystroke in one line of code related to time management that has nothing to do with Rybka's actual game-play. It is plausible that the reported incongruity was nothing more than a typo and absurd to infer the conclusions that have been made.
- Another example of the ICGA's "proof" of code-copying relates to "Piece-Square Tables" (PSTs). In an extended refutation, it is shown that the evidence used by the ICGA is based on false premises and is profoundly misleading in its presentation. The paper asserts that the falsity of the evidence presented cannot have been inadvertent, and that the main proponent of the ICGA evidence, Dr. Robert Hyatt, has demonstrated behaviors that call into question his objectivity.

Fundamental issues

Over the course of the paper other points undermine the ICGA's central argument:

- The ICGA formally charges Rajlich with "plagiarism". It is shown that Rajlich repeatedly praised Letouzey in two interviews and acknowledged him in the Readme file that came with his initial release. By definition, then, he did not commit plagiarism. This only leaves the ICGA with the more direct charge of "code-copying" which, it is argued, is simply not in evidence and requires tendentious interpretations.
- A case is made that one objective method of detecting improper use of another person's source code is to measure how similarly programs play chess in large number of test positions. Extensive independent studies have demonstrated that Rybka's similarity to Fruit is rather remote (Kai Laskos) or not more similar than to any other two unrelated programs (Dr. Miguel Ballicora). Conversely, a number of programs that have emerged in recent years that resemble other programs much more closely.
- The fact that Rybka 1.0 Beta was, from the start, over 150 Elo points stronger than Fruit 2.1, has a completely different board representation, a completely

different search algorithm, a very different evaluation, and does not play at all identically to Fruit or any other program that preceded it, means that Rybka must be considered, by any fair and reasonable standard, to be an original program. To which is added one caveat: that a great number of ideas and algorithms that are used in modern chess programs are re-uses and elaborations of the work of others.

The ICGA's handling of the case

It is argued that the ICGA's investigatory process was flawed from end to end and highly unprofessional.

- A panel was created, led by Dr. Robert Hyatt, who determined who would and would not be permitted to participate. No dissenting programmers served on this panel.
- The head of the ICGA, Dr. David Levy, wrote an article that appeared in ChessVibes that preemptively found Rajlich guilty of violating WCCC Rule 2. This article appeared before the final investigation was published.
- Rajlich was invited to defend himself against the charges. He did this in a way that he judged to be sufficient, given the absurdity of claims and in light of the public accusations and outrageous statements that had already been made online, which Rajlich knew to be false and ridiculous.

The paper argues that justice was not served either in the sense of Rajlich getting his due or the punishment fitting the crime. The finding of guilt is not reasonable given the lack of valid evidence presented, and if Rajlich did violate some lesser protocol implied in Rule 2, it was not of sufficient magnitude to merit stripping four world titles and imposing a lifetime ban five years after the fact.

What really happened

The paper concludes with an overview of computer chess scene as it existed prior to the ICGA's investigation and ruling. The paper argues that Rajlich's long dominance, which he was doing everything in his power to intensify year after year, was so overwhelming that it approached monopoly. The situation created understandable tensions within the computer chess community and indirectly threatened the viability of the WCCC tournament itself, which was inherently uneconomic for the participants and additionally offered them scant hope of a prestigious victory as long as Rajlich was competing.

The most recent WCCC, absent Rybka for the first time in years, lacked participation by any of the top seven-ranked programs in the world as well as the two co-champions by default from the previous year. In an overdue twist, it appears there is now a fair amount of support among the programmers for a modification of obsolete WCCC Rule 2, which was the proximate cause of the current deadlock in computer chess with regards to program legitimacy. The paper concludes that justice for Rajlich, in the form of an ICGA retraction, is an indispensable precondition for clearing a way forward for the hobby.