# "HANDS OFF EUCLID!": THE AMBIGUOUS RECEPTION OF THE "MODERN MATHEMATICS" REFORM IN GREECE

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# ABSTRACT

The modern mathematics reforms concerned a broad reorganization of school mathematics curricula. Their reception in the West was not homogenous and was defined by the various national contexts. The Greek case is highly interesting because of the distinctive place that mathematics holds in the Greek mentality. The initial active promotion of the reforms gave way to the underground dispute in terms of defending the national interests and protecting Euclid's system. The configurations which took place, with special regard to geometry, point out the contradictions of the Greek mathematical community. In particular, the first, experimental phase of the reforms was very carefully formulated by Greek authorities in a sequence spread over four years, while the second, generalized phase was abruptly set in motion through a highly ambiguous course. The context of this discrepancy lies in the instable social – political climate of the 1960s. The combination of a nationalistic framework of the 1960s and an efficient (albeit controversial) promotion at the outset of the reforms resulted in a compromising arrangement of counterbalance: introduction of modern mathematics side by side to the existing curricula. This process led to mixing of epistemological elements, reform fatigue of students and teachers and immoderate expansion of syllabi. The regime change, dubbed "Metapolitefsi" cut the path to a more alleviated approach of the reform, but did not result in a "back to basics" process.

# 1. Introduction

As is well known, the modern mathematics reforms are one of the most well documented topics in the history of mathematics education (Karp & Furinghetti, 2018). Thus, the literature on the reforms is already massive and constantly enriching. The Greek case, on the other hand, has been virtually left out of the research scope. My purpose here is to examine the modalities of the reform's reception in the Greek context of the 1960s, to describe its peculiarities and to propose a interpretative framework for this complex process.

#### 2. The "modern mathematics" reform in Greece

At first glance, the trajectory of the reform in Greece is not much different to those of Western Europe. A brief overview of the reform's phases can be as follows: after a very warm reception of the reform's objectives, the Ministry of Education set up an experimental procedure, which spread over the course of four years, and was evaluated as successful. Political instability that followed for the next three years, though, cancelled the educational reform underway as well as the modern mathematics reform. In 1967, the ultraconservative dictatorial regime reset education to its previous features. The modern mathematics reform was an exception: it spread to all high school curricula, with no differentiation regarding the students. The aftershock was felt by everyone around mathematics education. The 1974 regime change set the path to more moderate curricula.

Despite its analogies to the other western countries' trajectories of the reform, the peculiarities of the Greek case are striking and concern the specific features of the Greek mathematical community and their articulation with the national context of the Sixties.

#### 2.1. Aspects of national and educational context

In the 1950s, Greece entered a period of overall reconstruction and healing from the wounds of the second World War and the Civil War that followed it.

Until the end of the 1950s, mathematics education in Greece was defined as "Traditional Mathematics" (Toumasis, 1990). Similarly, the introduction of elements of modern mathematics in undergraduate curricula did not form a generalized shift to the latest developments in mathematics.

# 2.2. The Royaumont Seminar & Greek Mathematics executives: embrace & misunderstanding

Among the participants of the Royaumont seminar we find two Greeks with very different profiles: Nikolaos Sotirakis and Kanellos Georgontelis. We know very little about the second one. Sotirakis, on the other hand, was a well-known actor within the Greek mathematical community of the post war era.

Until 1961, the implementation of the reform in Greece was unanimous. This was due to the enthusiasm about the rapid scientific progress, combined with the more moderate spirit of the seminar than that represented in "*New Thinking in School Mathematics*" (De Bock & Vanpaemel, 2015). Thus, the Greek mathematical community embraced the Royaumont seminar conclusions. In what followed, the activity of two people had a particularly significant impact. Sotirakis, just mentioned, was the first.

The second was Nikolaos Michalopoulos, who at that point filled several key positions, among which the Presidency of the Hellenic Mathematical Society (HMS). Talking to the audience of the 1<sup>st</sup> Panhellenic Mathematical Conference, and having described the ongoing "revolution" in mathematics and its imminent introduction to school curricula, he linked the implementation of these changes with national duty and presented set theory as a Platonic discovery exploited by Cantor. This paradoxical association defined the public discussion throughout the 1960s. There is no indication that this argument was merely a ploy to justify the introduction of modern mathematics in school mathematics curricula. Therefore, it must be interpreted as an ideological choice, one that would impose or simply accelerate the reforms.

These perceptions were challenged by the fact that the modern mathematics reform was not merely irrelevant to Ancient Greek Mathematics, but also in direct contradiction to traditional Euclidean Geometry as a school subject.

#### 2.3. The first phase of the reform: experimental implementation

In November 1961, a committee was set up aiming at the experimental procedure regarding the reform of school mathematics curricula. The experimental procedure was designed in stages by the Ministry of Education and the OECD. The committee completed its tasks in the autumn of 1965 after four years of methodical work which composed of the writing of new textbooks, the supervision of the "pilot" classes, and the evaluation of the experimental procedure. (Ministry of Education, 1963)

Few were internationally involved in developing an experimental mathematics pedagogy (Schubring, 2014). Such an international norm is confirmed by the Greek case. A striking exception to this norm is N. Sotirakis, who regularly wrote articles and lectured on the subject.

### 2.4. Criticism of the modern mathematics reform

The reforms in Europe were not accompanied by significant reactions (Kilpatrick, 2012). In Greece, arguments based on "national duty" combined with the conservative political climate of the 1960s made foreseeable criticisms difficult.

The only substantial objection was expressed by the greatest contemporary Greek historian of ancient Greek mathematics, Evangelos Stamatis. His reasoning was controversial; however, the reaction against his views was ad hominem and excluded him from the public debate (Thomaidis, 1991).

It is worth noting that from the outset of the reforms, it was the main arguments regarding the implementation of the reforms concerned their relation to Ancient Greek mathematics.

### 2.5. The discontinuation of the reform

In 1964, the conditions were met for a new modernization effort, which focused on adapting education to the financial demands. After the first (experimental) phase of the "modern mathematics" reform was completed, the gradual publication of the new curricula began. What the Ministry of Education intended was to stabilize "modern mathematics" in the lower secondary education and to gradually expand it (Kritikos, 1980). However, political instability caused both reform procedures to halt.

# 2.6. The second phase of the reform: general implementation

The military dictatorship promptly disrupted the 1964 education reform, restoring its previous orientation. Meanwhile, they promoted the abrupt general implementation of "Modern Mathematics" in both lower and upper secondary education, regardless of the students' prospects and without substantial provision for the retraining of teachers.

In the following year, new curricula were published for all grades of secondary education. The proposed solution was a compromise: the inclusion of modern mathematics in the existing curricula. Nevertheless, this configuration created more problems than it actually solved, since it led to the mixing of opposing epistemological elements. In addition, it was not accompanied by an increase in the teaching hours.

# 2.7. The renaming of the "Appendix of the Bulletin of the HMS"

In January 1968, the HMS periodical "Appendix of the Bulletin" was renamed to "Euclid". This is highly interesting in terms of a semiotic framework, since its audience consisted primarily of students.

Later that year, "Euclid" accommodates the speeches delivered during the awards ceremony for the 1968 nationwide student mathematics competition. In his speech the HMS general secretary, Aristides Pallas (1968) argued that:

"Euclid's Elements were and still are considered to be the most perfect book of Geometry [...] endured and is still enduring absurd attacks, but it remains and will remain an impregnable fortress. So, our Motto is «Hands off Euclid»".

This is particularly revealing of the perceptions that prevailed in the HMS leadership and in the Greek mathematical community in general. Of course, a comparison with Dieudonné's slogan "Euclid must go!" cannot be avoided.

The renaming of the journal to "Euclid" coincides with the general implementation of the reform and illuminates the hegemony of a detached attitude towards "modern mathematics". In fact, this configuration corresponded to the implementation of the reform in the national context of the sixties.

#### 2.8. The aftermath of the second phase of the reform

In any case, it quickly became apparent that the results were unsatisfactory. In 1969, a more moderate curriculum was published, which remained in force for 5 years. However, the problems persisted. (Toumasis, 1990)

Furthermore, in stark contrast to the OECD directions, Euclidean geometry was rapidly growing in relation to the university entrance exams, which, set the pace for the developments in the secondary education. The educational reality revolved around exercise methodology in the spirit of these exams and therefore, the curricula' new content was mined. (Thomaidis, 1991)

#### 3. Conclusion

Apparently, the unfolding of the "modern mathematics" reform in Greece involves important peculiarities in relation to the international movement. The foreseeable strong reactions were expressed in an "underground" manner, and the public debate was distinctively limited. After the general implementation of the reform, the desired results were far from close, and some key aspects of the reform were gradually withdrawn. This process coincided with the restoration of parliamentary democracy. "Metapolitefsi" consisted of major reconfigurations, and "modern mathematics" was no exception. This process resulted in the transition to the configuration of moderated "modern mathematics". In other words, there was no backto-basics phase. However, these developments were fragmentary and resulted in an impasse.

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