My Galois

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1. Introduction

Èvariste Galois died in Paris on the 31st of May 1832 from the wounds he had sustained in a duel. He was only 20 years old – he was born on the 25th of October 1811 – but he had lived too much already, like a tragic hero, in whom genius and stupidity are merged into one. Why did he come to such a tragic and absurd end? To this day, the real motive of the duel is still unknown, and so is the identity of the other dueler. Perhaps Galois had been provoked by a political adversary; Galois was affiliated to a radical movement, and he was even incarcerated because of his revolutionary ideas and actions. Perhaps it was a matter to do with a woman, or perhaps he was indeed killed by a close friend, as I have chosen to describe in my play *Galois*, which was staged in May 2002 (in the form of a mise-en-espace) and in January-February 2005 (as a full production) at the Teatro Stabile di Genova, in both cases under the direction of Marco Sciaccaluga.

Legend has it that, certain that he was going to meet his end, Galois spent the night before the duel writing a long testament letter and, above all, frantically reordering his algebra manuscripts, adding to the margin of one of the theorems a sentence that has become legendary: “There is something to be completed in this proof. I don’t have the time.” (“Il y a

quelque chose à compléter dans cette démonstration. Je n'ai pas le tems." [sic]) Recent research has corrected the legend of Galois' "last night" and of Galois being completely misunderstood by his contemporaries, proving that part of his work was already well-appreciated by the scientific community[1]. His manuscripts were eventually published in 1846; it took, however, decades for the proofs to be completed and for the full implication of his results to be fully understood, results for which Galois is remembered as one of the fathers of modern algebra.

Galois' story is fascinating, but how can one bring it to life on the theater stage? How can one conjugate biography and legend? One can meet this challenge by letting History take the lead, of course, as well as Algebra, but narrating them with the utmost freedom in order to bring to the fore the tragedy of a man – indeed, hardly more than a kid – who at twenty years of age has already lived three lives: that of a mathematician, that of a revolutionary, and that of a lover. And who, burned by passion, weary and certain to have failed in each of these lives, does not have the strength and time to live them further.

2. The idea: a fascinating character

Galois is a fascinating and multifaceted character: he is not only a precocious mathematical genius, but also a political activist, besides – and perhaps above all – being just a normal kid who is suffering from both the first palpitations of love and an adolescent angst. In fact, there are several authors who have been fascinated by Galois; perhaps, as in my case, after having come across the story of his short life and absurd death while studying his work at the university: how is it possible that one of the fathers of modern mathematics was at the same time such an immature and foolish kid to enter and be killed in a duel at only twenty years of age?

[1] On this subject, see the brilliant semi-fictional biography of Galois written by Alexandre Astruc [1], the thorough books by Piero Pagli and Laura Toti Rigatelli [2,3], and, in particular, the essay by Tony Rothman [4], which illustrates how the legend is largely due to the fantasy both of Paul Dupuy [5], the first biographer of Galois, and of E.T. Bell [6].

It is certainly the case that many scientists have met violent and/or premature deaths, and many of them have lived "dramatic" lives, which lend themselves well to being told on the theater stage, on the movie screen, or in the pages of a novel. In fact, there are a large number of works – movies, plays, and books – that tell the story of a mathematician or, more generally, of a scientist. The following are but a few recent examples: the plays *Partition* (by Ira Hauptman, 2003), which recounts the short and tragic life of the Indian self-taught mathematician Srinivasa Ramanujan (1887-1920); *Proof* (by David Auburn, 2001), which tells the story of the sentimental dramas of a family of mathematicians; *Copenhagen* (by Michael Frayn, 1998), which describes a fictional meeting between the nuclear physicists Niels Bohr and Werner Heisenberg in Copenhagen in 1941; and *Arcadia* (by Tom Stoppard, 1993), in which the actions jumps brilliantly between the present and the past in order to tell, among other things, the story of a child prodigy in mathematics in the 19th century; the movies *Enigma* (Germany/U.K. 2001, directed by Michael Apted, screenplay by Tom Stoppard from the novel by Robert Harris), which has been strongly inspired by the life of the mathematician Alan Turing[2]; *A Beautiful Mind* (USA 2001, directed by Ron Howard, screenplay by Akiva Goldsman from the book by Sylvia Nasar), which is a very fictional, Oscar-winning account of the life of the schizophrenic mathematician John Forbes Nash (1928), winner of the Nobel Prize for economy in 1994; *Π* (USA 1997, written and directed by Darren Aronofsky), in which a mathematician is convinced that the world, life, and God can be explained by means of the numbers and the letters of the first books of the Bible; *Good Will Hunting* (USA 1997, directed by Gus Van Sant, Oscar-winning screenplay by Matt Damon and Ben Affleck), which describes the coming of age of a young janitor at the MIT who grows from a wild and rebellious mathematical genius into a researcher, and a man, thanks to psychoanalysis and, mostly, love; and also *I.Q.* (USA 1994, directed by Fred

[2] Alan Turing (1912-1954), one of the founders of computer science, died of cyanide poisoning, a half-eaten apple beside his bed. Although the ensuing inquiry did not clarify all circumstances, and in fact left many questions unanswered, the coroner's verdict was suicide.

Schepisi, screenplay by Andy Breckman and Michael Leeson), a comedy which portrays Einstein as a professor of love and life with the playful and "screwball" support of the physicists Boris Podolsky and Nathan Rosen and the mathematician Kurt Gödel[3]; and the novel by Tom Petsinis about Galois [7] (after the preceding fictional biographies written by Leopold Infeld [8] and John Sommerfield [9], besides for the aforementioned one written by Astruc), as well as the books by Leonardo Sciascia and Erasmo Recami on the physicist Ettore Majorana [10,11].

In several of these works, as well as in other, less recent ones (such as the movie *I Ragazzi di Via Panisperna – The Kids of Via Panisperna* – Italy 1988, directed by Gianni Amelio and written by Amelio himself together with Vincenzo Cerami and Alessandro Sermoneta – which tells the story of the group of Italian physicists that was lead by Enrico Fermi and included Ettore Majorana), the mathematician/scientist is represented as an antisocial genius, on the verge of autism and almost incapable of having any sort of relationship with the people around him. This is not by choice, but by destiny: it is the price to pay in return for knowledge. For my Galois, as for many other characters inspired by real people – such as Majorana, Ramanujan, Nash, Turing, Gödel, but also for the mathematician Renato Caccioppoli (1904-1959) of the movie *Morte di un Matematico Napoletano* (*Death of a Neapolitan Mathematician*, Italy 1992, directed by Mario Martone and written by Martone together with Fabrizia Remondino), who committed suicide – things are not so different. History, however, tells us that this is, more or less, what actually happened to Galois.

Reprising topics from the book [13] by Joseph Campbell, Christopher Vogler writes [12] that although there are different types of hero, all of them become one by abandoning the "village" to embark on a quest for some kind of elixir (whatever that may be; for example, power, wealth, knowledge, grace). There is the hero who eventually returns to the village bringing

[3] Kurt Gödel (1906-1978), one of the greatest logicians of the twentieth century, was not really so playful and "screwball": during the last years of his life, he convinced himself that somebody was trying to poison him and refused to eat until he starved himself to death.

the elixir with him, and thus bringing his heroic saga to a resolution, a circular *denoument*. There is, however, also the hero who, like Galois, my Galois, will not return to the village to bring the fire of knowledge, because his linear voyage has brought him so far away from the human village that he now speaks a language "different" than that spoken by those that he has left behind. He cannot (and, ultimately, does not want to) go back, because if that is the price to pay for mathematics, then my Galois is willing to pay it, at least at the beginning of the story told in my play. It does not matter much, so he believes, to be different from those around him, incapable of having a relationship with those who love him, or rather, those who would like to be allowed to love him; it does not matter much, so he believes, until first History and then Love (although unrequited) thrust him violently back in the midst of mankind. Then my Galois realizes that he really is "different", but without the possibility, the capability, to communicate. And this makes him suffer, so that he decides to act accordingly, until the inevitable fulfillment of the tragedy. Behold a tragic romantic hero, a romantic tragic hero.

3. A tragic romantic hero, a romantic tragic hero

One cannot tell the story of Galois without recounting his three passions: Mathematics, Politics, Love. One can, however, choose to highlight one of his passions and narrate Galois' story from that point of view, for instance, like in the movie by Ansano Giannarelli *Non ho tempo* (*I don't have time*, Italy 1973, written by Giannarelli and Edoardo Sanguineti with the help of Lucio Lombardo Radice) in which Galois is portrayed as a political hero who is trying to change the world not only by means of his mathematics but also, and even more so, with the revolution. When writing my play, I have decided to let all of Galois' passions live in him simultaneously, trying however to avoid simply turning him into a schizophrenic like John Nash, a paranoiac like Max Cohen in *Π*, or a violent misfit like Will Hunting. My Galois is a kid (although he detests any reference to his young age) who is involved, partly unwillingly,

in three "adventures" that are bigger than him and who, feeling spurned by all three of his loves, feeling that he has failed in each of his three lives, decides to die in order to relieve himself from these three unbearable burdens (Photo 1)[4].

The burden of Mathematics: the vast majority of the contemporary scientists were unable to understand Galois' works and, moreover, some of his most important results were ascribed only to the late Abel, who had obtained them at the same time but independently[5].

The burden of History and Politics: several insurrections took place in Paris during the final years of Galois' life, in which he participated (or tried to participate), such as, most notably, the Three Glorious Days of the end of July 1830.

The burden of the First Love and of the guilt-feelings caused by this love: in this case, I have taken quite a great biographic liberty, imagining that the Stéphanie for whom Galois had lost his head – "Stéphanie", wrote the real Galois on the margins of the pages of his mathematical notes, like any ordinary adolescent, although he never clarified who this Stéphanie actually was – was the fiancée of his best friend, Vincent Duchâtelet (Photo 2)[6]. Another liberty I have allowed myself to take is to merge in Vincent and in the character of Auguste Chevalier, friend to both Galois and Vincent, not only the real Vincent and Auguste but also other young revolutionaries and, in particular, Galois' brother Alfred.

In fact, my Galois is loved. For instance, by his mentor Louis-Paul-Emile Richard, who was his boarding school mathematics teacher and who comprehends his mathematical genius and, albeit unheeded by Galois, heartily and repeatedly encourages him to pursue an academic career (Photo 3)[7]. Galois is also loved by François-Vincent Raspail, the president of the revolutionary Society of the Friends of the People (which ranks among its members also

[4] Photo 1: Galois (Flavio Parenti). This photo, like all the other ones published here, was taken by Patrizia Lanna during the mise-en-espace directed by Marco Sciaccaluga at the Teatro Stabile di Genova in May 2002.

[5] That of the Norwegian mathematician Niels Henrik Abel (1802-1829) is another story that would merit being told in detail. Abel was a contemporary and unwilling competitor of Galois, working on similar topics, who also died young, of hardships, while waiting for the recognition of his results. The recognition arrived posthumously, a few days after his death.

[6] Photo 2: Vincent (Silvio Laviano) and Galois.

[7] Photo 3: Richard (Biagio Forestieri) and Galois.

Galois and Vincent), who recognizes Galois' political inspiration. And, of course, Galois is also loved by his friends Vincent and Auguste, who are in awe of his genius besides loving him like a brother, and by Stéphanie herself, who looks up to him so much as to confide in him her torments and fears and to turn to him for help. Galois, however, misinterprets this confidence and, thinking that Stéphanie returns his love (Photo 4)[8], he assails her and tries to kiss her. Vincent arrives in time to stop him and cannot do anything but challenge Galois to a pistol duel; a challenge that Galois immediately accepts.

My Galois is, however, not only loved by many but also despised by others. For instance, by the professor Siméon-Denis Poisson, who flunks Galois at the entrance exam for the Polytechnique of Paris and who, in my play, again with some historical liberty, represents that group of academics who "don't understand my mathematics and are scared of it", as my Galois says in one of the initial scenes. Galois is also despised by Joseph-Daniel Guigniault, the director of the École Préparatoire of Paris, attended by Galois after his failed entrance exam at the Polytechnique, who does not allow Galois and Vincent to take part in the Three Glorious Days and then punishes their insubordination by expelling them both from the École. Above all, however, my Galois is despised by himself: he is incapable of loving himself, or, at least, of tolerating his own flaws (such as his impetuous temperament, a strong lack of patience, and a good deal of arrogance, although the latter also derives from his confidence in his own mathematical abilities) by understanding that these flaws are but a small price to pay for his genius. It is precisely this lack of self-awareness, this self-hate, that leads my Galois to be killed by Vincent in the fratricidal duel in the last scene of the play:

> *The Pond of the Glacière. Dawn. Galois and Vincent come closer slowly, up to 15 paces apart.*
>
> **Galois:** Here I am, Vincent Duchâtelet!

[8] Photo 4: Stéphanie (Giovanna Lotti) and Galois.

The bell tolls 6 times.

Vincent: The first shot is yours.

Galois: Together!

Vincent: Together?

Galois: Together.

Vincent: Aim, then.

While they both slowly raise the arm holding the pistol, we hear, from afar, the singing of the revolutionaries (among them Raspail […and the other members of the Society of the Friends of the People) who are marching through the streets of Paris. Stéphanie is in the garden and watches the sun rise as she cries and prays, and Richard is praying too, at his house.

Galois: What are you waiting for?! Fire!

Auguste: *(Arriving in a hurry)* Évariste! Vincent!

Vincent: I can't, Évariste. I can't!

Galois: Shoot, coward, shoot!

Vincent: *(Lowering his arm)* I can't.

Galois: Shoot! Shoot! Shoot!

His arm raised but without shooting, Galois runs towards Vincent, who, frightened, fires: Galois, mortally wounded, falls to the ground. Lights out.

"Don't cry. I need all of my courage to die at twenty", said Galois to his brother Alfred before dying in the Cochin hospital in Paris, at 10 o'clock on the 31st of May 1832, from the grave wound to the abdomen sustained during the duel of the preceding morning [2,3]. "Stop crying, I beg you, stop! I need all of my courage to die at twenty", says Galois to his friend Auguste in the penultimate scene of my play, when Auguste makes one last, vain, attempt to convince him not to keep the appointment for the duel. One needs really a huge amount of courage to squander such genius, to throw away a life in such an absurd way. Alas, Évariste Galois did have that courage.

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