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March 30, 2021

Retrieved on 5th May 2021 from
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I saw the mountains that rose from the water, saw the first men of wood, saw the water jars that turned against the men, saw the dogs that tore at their faces. I saw the faceless god who is behind the gods. I saw the infinite processes that shape a single happiness, and, understanding all, I also came to understand the writing on the tiger.

It is a formula of fourteen random (apparently random) words, and all I would have to do to become omnipotent is speak it aloud. Speaking it would make this stone prison disappear, allow the day to enter my night, make me young, make me immortal, make the jaguar destroy Alvarado, bury the sacred blade in Spanish breasts, rebuild the Pyramid, rebuild the empire. Forty syllables, fourteen words, and I, Tzinacán, would rule the lands once ruled by Moctezuma. But I know that I shall never speak those words, because I no longer remember Tzinacán.

> Jorge Luis Borges "The Writing of the God" (Trans. Andrew Hurley)

Alexander Grothendieck started out as the greatest mathematician of the Twentieth Century, and ended up as a destitute hermit, lost in a labyrinth of ideas, dreams and maybe delusions that we still haven't been able to decipher. It's a very different story to that of Herbert Dingle, the subject of my last post. Dingle understood little of what he believed he'd mastered. Grothendieck maybe comprehended everything that he was afraid he misunderstood, and we're still left asking questions about his work and looking for the answers.

Grothendieck (pronounced 'Grotendic') was born in Berlin in 1928. His parents were, for lack of a better term, professional revolutionaries. His father was probably called Alexander 'Sasha' Shapiro, but he accumulated dozens of other names as he changed countries. He was a Jew of Ukrainian origins born in Novozybkov (now in Russia), apparently from a middle-class family, though it's difficult to establish to what extent all this is true. As a very young man, he embarked on a career in anarchic militancy that he kept up his whole life. In 1905, at the age of 16, he participated in the attempt to assassinate Tsar Nicholas II. The attempt failed, and all the conspirators were executed except for Sasha, spared because of his youth. He stayed in a Tsarist prison camp until 1914 when he tried to escape by injuring one of his arms. It was amputated, and he spent three years in an isolated cell. In 1917 he was freed by the October Revolution and then continued to be an anarchist allying himself with the Bolsheviks. He participated in the civil war that followed, but in 1921, having foreseen the Leninist government's anti-anarchist repression, he escaped in a highly adventurous fashion to Berlin, leaving his first wife and son in Russia.

In the next ten years, Sasha led a wandering life between Berlin, Paris, and Italy, meeting and collaborating with all

crown his old age and absolve him from his labors. He walked toward the sheets of flame. They did not bite his flesh, they caressed him and flooded him without heat or combustion. With relief, with humiliation, with terror, he understood that he also was an illusion, that someone else was dreaming him.

Jorge Luis Borges "The Ruined Circles"

Thanks to Marco Casolino and Marco LG for help in editing this piece, despite their multiple commitments

Thanks to Katherine Liddy for kindly translating in English from the Italian original

the main actors of International Anarchy at the time. In 1927 he met Johanna 'Hanka' Grothendieck, a German journalist from Hamburg with Socialist views, who was already married. Hanka and Sasha had an affair which led to the birth of Alexander, and as a result, they started living together. They decided to give Alexander his mother's name, as they were worried by the growth of antisemitism in Europe. The little family led quite a hard life, surviving entirely on Sasha's work as an itinerant photographer. This lasted until Hitler's arrival in 1933, when Sasha and Hanka fled to France, leaving Alexander and his half-sister Maidi with a German family headed by Wilhelm Heydorn, an interesting figure who was a former army official and former Lutheran pastor who had been converted to humanitarian Socialism and who took in children that had been separated from their parents. To all intents and purposes, Sasha and Hanka abandoned Alexander to carry out their political activities, passing from France to Spain, where both of them fought with the republicans in the civil war.

In 1939 Heydorn was no longer able to look after the kids in his care, and he sent Alexander (alone) off to Paris, where his mother Hanka was waiting for him. The situation in France was quickly becoming extremely difficult for Grothendieck and his parents because as 'political enemies' they couldn't return to Germany; at the same time Germans were considered undesirables in France. As if that wasn't enough, Alexander's father was Jewish and considered a dangerous extremist. When the war broke out, Sasha Shapiro was sent to an atrocious internment camp for 'undesirables', whereas Hanka and Alexander ended up in another, Rieucros, which was slightly less terrible. Alexander never saw his father again; in 1942, when the Germans invaded France, he was sent to Auschwitz, where he died.

Alexander and his mother managed to eke out a very harsh existence in Rieucros, where Alexander, who was now 14

years old, was allowed to continue his studies in a haphazard way. He led a precarious existence threatened by starvation on one hand and heavy maltreatment at the hands of the French (who viewed Alexander and his mother as 'Germans') on the other. Alexander was helped by the fact that he was pretty muscular for his age, and by the fact that he learned to use his fists while defending himself from violence, an ability that he demonstrated later on in different circumstances. In 1942 his mother was transferred by the Germans to another camp, but Alexander, in an unexpected stroke of luck, was transferred to Le Chambon-sur-Lignon, a little town in the Upper Loire transformed by the energetic local Protestant pastor into a refuge for Jews and 'undesirables'.

Here Alexander was able to attend the local high school, albeit at enormous risk to himself. Because he was the child of a couple of political activists and of a Jewish father, he risked deportation or death multiple times, saved only thanks to the help of some pious local souls, or to seeking refuge in the woods during German raids.

In his memoir *Reaping and Sowing*, Grothendieck speaks with admiration of his parents for their political conviction. But it's clear that we're talking about parents who were frequently absent, maybe more interested in militancy than in raising a son. Sasha, his dad, was a role model for Alexander but a distant one. Hanka, his mother, having quite an aggressive temperament, was simultaneously absent and overbearing. The realization that his parents, whom he initially idolized, effectively abandoned him to pursue a political ideal, would later become a kind of 'discovery of evil' for Alexander.

In 1945, at the end of the war, Alexander was reunited with his mother, who in the meantime had contracted tuberculosis, from which she died in 1957. They were alone, very poor, and without prospects. Alexander had effectively become stateless, a man without a country, because his documents had been left in Berlin and destroyed. To keep himself and his mother alive,

Grothendieck had started to take an interest), politics and especially religion and the problem of the existence of Evil, which seemed to obsess him to the end.

Grothendieck might have left the world, but the world remembered him. Few mathematicians have had a cult (underground but intense) grow up around their name as Grothendieck has, a cult that he not only did little to encourage but which he clearly abhorred. Near the end of his life, some adventurous souls managed to find his hideout and to try to meet him. Most of them went away without having managed to see him. A tiny few were more fortunate. Among all of these an Iranian mathematician studying in France had the most touching encounter. Grothendieck was clearly very elderly, and practically deaf. But he seemed in good health. When the Iranian student asked him if he could take a photo of them together, Grothendieck refused, but hugged him instead saying 'This is a better memory than any photo'. And then he added, "You must excuse me, but I can't invite you into the house. Inside there are…entities. Entities that would do you harm."

Alexander Grothendieck died November 13 2014, at 86.

> *His misgivings ended abruptly, but not without certain forewarnings. First (after a long drought) a remote cloud, as light as a bird, appeared on a hill; then, toward the South, the sky took on the rose color of leopard's gums; then came clouds of smoke which rusted the metal of the nights; afterwards came the panic-stricken flight of wild animals. For what had happened many centuries before was repeating itself. The ruins of the sanctuary of the god of Fire was destroyed by fire. In a dawn without birds, the wizard saw the concentric fire licking the walls. For a moment, he thought of taking refuge in the water, but then he understood that death was coming to*

Bilbo Baggins at the start of *The Lord of the Rings*. For years, no one knew anything more about him.

Grothendieck's disappearance became the stuff of legend. It yielded all the most absurd hypotheses. That he'd killed himself. That he'd gone to the United States or to South America. That he'd entered a monastery in Asia. The reality was known only to a handful of people, one of his sons among them, and didn't emerge until 20 years later, shortly before Grothendieck died. The great mathematician, who had let his beard grow long and almost always wore a strange arab-style caftan, had taken refuge in a tiny village at the foot of the Pyrenees, where no one knew him. He lived there for 23 years, in a shabby abandoned farm, in total isolation. The village's 200 inhabitants, who didn't know who he was, soon got used to his presence, respecting his privacy. He received very few visits, all of them from the few people who knew about his new residence, and soon not even from them. He resumed his usual habits, very few hours of sleep, and the light on until very late. He grew all the food he ate, and only rarely accepted any food given him by his neighbors, who saw him only when he went out to smell his flowers or to go on an extremely rare errand to the post office.

Around 2008, some information on his whereabouts filtered through to the outside world, and some people started writing to him again. The great majority of letters were sent back unopened or opened and annotated in a meager way. The only 'official' message that he sent in 23 years was to say that he didn't want any of his writing to be printed or reprinted, and he harshly condemned the fact that some of his old friends and students had put together a website, 'Grothendieck Circle', which collected writing by him or about him (the site still exists).

It was only after his death that anyone could find out the nature of Grothendieck's work in the last 23 years of his life. Thousands and thousands of pages on themes very different from one another. Mathematics, physics (in which

Alexander got work where he could, sometimes as a seasonal harvester. The two supplemented their diet with what they managed to grow themselves in an improvised garden. In order to scrape some money together, Alexander produced and sold 'bootleg' wine for less affluent country farmers. Maybe because of all this, or in spite of it, by the end of the war Alexander (who was 17) already possessed four characteristics that would stay with him his whole life: a strong and almost ascetic connection with the land, a profound sense of moral direction, a fierce political radicalism, and above all a passion and incredible talent for mathematics.

The connection between Grothendieck and mathematics has something of supernatural about it. In 1946, when thanks to his 'refugee' status he enrolled in the little and provincial university of Montpellier, Grothendieck was already a kind of prodigy. He only occasionally attended lectures, and he read textbooks only when he was forced to do so. He didn't learn mathematics, he invented it from scratch. In 1948, when his peers were still struggling to come to grips with mathematical analysis, he had rewritten—without having taken a course—Measure Theory; an advanced branch of mathematical analysis. His professors realized they were up against an extraordinary talent, and they told him to go to Paris, to attend lectures by Henry Cartan, son of the legendary mathematician Élie Cartan (and brother of the physicist Louis Cartan, hero of the French Resistance who was shot by the Germans in 1943). Grothendieck enrolled in Cartan's courses 'quick smart'. Years of extreme poverty and privation had turned Alexander into a young man who was tough, direct, and who had great determination behind his gentle smile. His colleagues were amazed by the way he interacted with the professors as if he were one of their equals. He wasn't presumptuous or unpleasant (on the contrary), but he knew what he wanted. In a certain sense, he was the opposite of the stereotypical nerd à la Sheldon Cooper. At the blackboard, he demonstrated that

he'd singlehandedly reconstructed mathematical theories that (citing one of his teachers) "had needed decades to establish in the first place".

Cartan intuited that underneath that determination and talent lay the deep obsession (exacerbated by the traumas he'd undergone) of someone who felt that he was 'foreign', and that the rarefied and competitive environment of the great Parisian universities would crush him. He sent Grothendieck to Nancy, at the time one of the best French 'centers of mathematical production'. But it was in Paris that Alexander made a name for himself, and became friends with people like Claude Chevalley, Jean Dieudonné, Laurent Schwartz, and André Weil, the brother of the celebrated writer and philosopher Simone Weil and maybe the best French mathematician of those years. These men, under the 'collective name' of Nicolas Bourbaki, had been making an immense encyclopedic effort towards 'the rewriting of mathematics' in axiomatic and extraordinarily rigorous terms, all in order to furnish their students with standardized tests for exploring even the most advanced subjects. 'Bourbaki' was in many ways a revolution in the way we study mathematics, which had a lot of positive effects (because of the standardization of materials) but also some negative ones. The aridity and excessive abstraction that characterized the teaching of mathematics from the '60s to the '80s came out of 'bourbakism', and now they are fortunately tempered by a greater reliance on intuition. Grothendieck collaborated with the Bourbaki group, but he quickly distanced himself from it to fly in very different and ever more distant directions.

In Nancy, even before writing his dissertation to gain his doctorate, Grothendieck became one of the major experts in topological vector spaces, a branch of functional analysis that became important a little later because of Einstein's controversy to do with non-deterministic interpretations of quantum physics (summed up in Einstein's very famous saying 'God

one example to clarify this. At that time a woman approached him, striking up a rapport mainly through letters and phone calls. This woman was clearly suffering deeply both physically and psychologically. In this case, Grothendieck behaved in a perfectly rational and responsible manner, first trying to comfort her, and then pointing her to someone who could give her professional help, assuring her that he would follow this help up, and keep himself informed of the outcomes.

Whether he was, whether he wasn't, on January 26 1990 Grothendieck wrote a letter addressed to a select group of friends. He called it 'La Lettre De La Bonne Nouvelle' (The Letter of Good News') and in it Grothendieck insisted that he had had some visions, through a female entity who he identified by the name of 'Flora', who had convinced him that the apocalypse was imminent, and that it was his strict duty to warn the recipients of the letter of what was about to happen. This letter was followed by a second one, in which Grothendieck mentioned considering at least part of these 'visions' (which Grothendieck himself described as genuine and real episodes of possession) had a malign origin, and so were substantially false. It seemed that Alexander Grothendieck, the greatest mathematician of the twentieth century and one of the greatest of all time, had gone completely insane.

These two letters were followed by a dramatic episode. In June of 1990, Grothendieck stopped eating for 45 days. He was found by one of his children in a semicomatose state and subject to violent hallucinations, afraid for his life. Miraculously Grothendieck, who was 62 years old, survived without any physical consequences. At this point his friends and children were convinced that Grothendieck's mental health was irrecoverably compromised. But there was another twist. Grothendieck seemed to go back to being perfectly normal. He gave one of his friends 20,000 typewritten sheets of mathematical works and unedited personal writings, and he disappeared westward, in a way that is very reminiscent of

From this moment on, and we are around 1987, the content of Grothendieck's messages is ever more agitated and apocalyptic. He writes another two brief works of a tone similar to the preceding one: *'Notes to the Key of Dreams'*, and 'The Mutants'; an examination of twelve historical figures who Grothendieck thinks are a sign of evolution of the human race. Here it's interesting to note one thing. In general, when a scientist or someone normally associated with 'reason' has an intense spiritual crisis such as that experienced by Grothendieck, they have the tendency to become introverted, more conservative. Their apocalyptic visions (convinced that humanity will soon face a scenario reminiscent of Stephen King's The Stand) are accompanied by a further radicalization of his pacifism and his anarchism. While he refuses the atheistic and antireligious environment of his parents, on the other hand, he sees in war, in militarism, and in the physical assertions of power Absolute Evil. And it's typical that one of the 12 'mutants' is none other than Eddie Slovik, the only American soldier shot for desertion in the Second World War. Slovik wasn't a hero (far from it) but a fragile person, a crook, not very intelligent, and even, openly, a coward. But Grothendieck sees him as an image of the future of humanity.

In 1988 Grothendieck was offered a very prestigious mathematics award, the Crafoord Prize, which also includes a significant monetary reward. Without hesitation, he refused it, saying that feeding this circuit of prizes and public acknowledgments horrified him and that in any case, he'd done nothing to deserve it.

It is from this exact moment that the most mysterious part and strangest event of Grothendieck's human history begins. Before describing it, I just want to clarify one point. There is no concrete evidence at all to prove that Grothendieck was crazy or even disturbed in 1988. And Grothendieck definitely wasn't using alcohol or drugs. His conversation and behavior in 'practical' terms was not just normal, but strikingly balanced. Just

does not play dice'). At this point, I think it's necessary to remark once again how extraordinary Grothendieck's ascent really was. In 1945, when he enrolled at University, he was practically an autodidact. In 1953, at the end of his undergraduate career, he'd become one of the major European mathematicians. It's more or less as if someone went from getting their driver's license to competing in the Formula 1 World Championships in a couple of years. And Grothendieck's career had only just begun.

One episode stands out above the rest. At Nancy Grothendieck's professors wanted "to make him know his limits" and simultaneously to test his ability. They presented him with a list of fourteen unsolved mathematical problems to do with vector spaces (a branch of functional analysis), asking him to choose one or two and to try to solve them. The expectation was that solving one of them would take at least a year. Four months later Grothendieck had solved SIX of them, and by the end of the year he'd solved all fourteen. It was as if he'd written fourteen dissertations in one year. Jean Dieudonné, one of the other great French mathematicians of the Bourbaki group and his supervisor, was so unnerved by it that he spent the next 15 years practically acting as Alexander's secretary, even though he was much older than him.

In the second half of the '50s, Alexander 'went on the offense' and practically remade the branch of mathematics to which his name is linked: algebraic geometry. Without boring the reader, it's worth briefly explaining what this is. In practice, algebraic geometry studies the properties of shapes created by 'zeros' of polynomial equations. When I put like that it sounds nonsensical, but we have all seen this example at school, the equation

X^2+Y^2=1

Points X and Y that satisfy this equation form a circle of radius 1. It's not hard to test it on Excel. The same equation can be rewritten as follows:

X^2+Y^2−1=0

And so we say that 'the zeros' of this function, i.e. the parameters X and Y that make the result of the function be zero, form a circle.

The study of shapes (or 'curves') associated with equations have very ancient origins, but its modern form comes from the so-called "Italian school of algebraic geometry", that group of adventurous Italian mathematicians which emerged between the mid-nineteenth and the mid-twentieth century and formalized the subject. The history of this school is the umpteenth sad story of Italian excellence destroyed by a mixture of academic and cultural snobbery, and by the devastation brought about by the infamous fascist racial policies, which meant that at the end of the Second World War Italian science and mathematics were in pieces and those pieces fled elsewhere, especially to the United States.

After the war, France supplanted Italy and Germany as the leading nation of mathematics in Europe and the world. Grothendieck couldn't have found himself in a better position, and he rearranged the subject of algebraic geometry from top to toe, combining it with the methods of abstract algebra. Although it hides behind abstruse terminology, the classic idea is relatively simple and brilliant.

At the time when Grothendieck started to interest himself in the field, algebraic geometry was constructing geometric structures called 'algebraic varieties,' in practice, almost every shape which, if enlarged enough, turns out to be flat but which overall is curved (the simplest example, our dear old Earth, or almost any ball!), as well as algebraic structures called 'rings', in practice almost any closed set of objects that can be added, subtracted and multiplied (but not divided!) but whose result is always part of the same closed set (another very simple example—the integers that we learned in elementary school). Studying 'manifolds' and 'rings' linked to polynomial equations one passes easily from algebraic shape to geometric

pseudo-book that Borges invokes in the short story "The Garden of Forking Paths", Reaping and Sowing is a text in which you get lost, that can be read starting from any point and walking in any direction. Someone has written that if properly edited it might have been a best seller, but I think this reveals a misapprehension of what Grothendieck wanted to do. The fact that (opening the book at random) you can find passages that talk about angels, then about the problem of nuclear weapons, then about Grothendieck's childhood memories, and then about everything else, it's not necessarily a sign of confusion. It's controlled chaos, a labyrinth (a real one) in which Grothendieck wants to make his reader to get lost and then to give them subtle clues that lead them to the exit.

In 1986, when his mathematical production was flourishing but more and more irregular, Grothendieck writes the most problematic and strange of his works. '*La Clef Des Songes*' ('The Key of Dreams'). As the title says, it's a book of dreams. It's a book about God. Grothendieck's thesis is simple. We meet God in dreams. But we aren't ourselves dreaming God, rather God Himself is dreaming us. Or better: according to Grothendieck 'a Dreamer' exists, an external force who 'dreams our dreams' and at the same time dreams us. And this force can only be God.

To put it like this it seems almost like new age charlatanism. But reading the book you get a different impression. Grothendieck's dreams are very vivid, but they always have an apocalyptic tone. Grothendieck explores the nature of God, declares that God has given us a mission, that it's to help others and to 'find ourselves'. And he declares, in a little footnote that it's almost hidden, that mathematics wasn't 'created by God' nor by man, but by an aspect of God's nature that, unique among his attributes, is accessible to human reason.

'papers', he produced informal tests, the goal of which was not to rigorously establish theorems but to throw up ideas that might then be developed by others. The most legendary test of this time is 'Esquisse D'Une Programme' (Sketch for a Program), a research proposal on various subjects in advanced mathematics, especially the theory of the Galois Groups, one of the most important modern mathematical subjects. The proposal was rejected by what was the French equivalent of Italy's National Research Council (Consiglio Nazionale delle Ricerche or CNR). But this test, never officially published, became the source of thousands of studies in the next 40 years, and has been called, "the most successful—rejected—research proposal in history". One of the most interesting ideas presented in this 'Sketch' (which was written in very informal language) are the Dessins D'Enfant (kids' pictures), which are simply diagrams similar to the very stylized ones that schoolkids make when asked to draw a human body, or those in puzzle books where you have to 'join the dots and see what appears'.

Grothendieck had discovered that with simple diagrams like this, it was possible, by changing the orientation and shape of circles and arrows, to express very complex mathematical concepts in an intuitive way. The 'kids pictures' are still a much-studied topic in contemporary mathematics.

Around the middle of the '80s, Grothendieck produced an autobiography of more than a thousand pages. *Reaping and Sowing*, self-published, and now subject to almost secret translations. A gargantuan book, an unrestrained river of information, where Grothendieck mixes personal recollections, invective, considerations on mathematics and what surrounds it, pointers for the future, a little bit of everything. When I started studying Grothendieck's story, someone told me, 'it's an unreadable text'. Now that I've read it, I'd say not. It's not an 'unreadable' text because it wasn't written to be read as a novel or an autobiography. A bit like the labyrinthine

configuration and vice versa, obtaining surprising results on both sides.

Grothendieck's stroke of genius was this: to imagine the existence of *n*-dimensional structures even more general than the 'manifolds' called 'schemes', which are just like the manifolds in that they are fundamentally an n-dimensional generalization of the familiar three dimensions of Euclidean geometry. One 'scheme' is formed by taking a ring, for example, those whole numbers, and 'sticking them' onto a geometric object called 'the spectrum of the ring' (everyone thinks of Tolkien at this point). This forms a kind of surface more general than the 'manifold', in which the concepts of 'point' and 'curve' merge. It is as if a new world was thrown open to humanity, a world that always existed but that we didn't know about.

This thing I'm describing in very few words was just the start of Grothendieck's exploration of this new and strange universe. He soon added other concepts to the 'scheme', ever more general, ever more remote, ever more abstract.

It's always said that mathematicians are basically problem solvers. Grothendieck didn't solve problems, Grothendieck created worlds.

His approach was always 'from the top'. He would intuit the presence of a structure, give it a name, often a very poetic one, and then define it in a relentlessly rigorous manner, connecting it with the rest of mathematics. It's an approach that very few people have managed to do without getting lost, and one that requires enormous mental discipline (Grothendieck called it 'a yoga') and not inconsiderable psychological –not to mention physical—strength.

As an American academic who knew him has written that, notwithstanding his kindness and openness, there was something alien and inhuman in Grothendieck. His routine in the 'Golden Age,' up to 1970, became legendary. He worked until eight o'clock, seven days a week, every day of the year except for some very brief vacations, often sleeping in his office,

or not sleeping at all. In fact, he could decide how much he was going to sleep 'at will', an ability that never ceased to amaze his friends. He ate very little, mainly milk and vegetables. He produced hundreds of pages scrawled by hand, which Jean Dieudonné patiently transcribed into legible form every evening.

A lot of mathematicians are a little 'removed from reality', others are very practical. Grothendieck transcended these clichés. He was extremely polite, but also direct in his way of speaking to people and to students. He wasn't an aggressive or abusive teacher, but he demanded a great deal from students, especially in terms of effort. He lacked almost every kind of pretentiousness, maintaining that it's always the simple and obvious things that are most mysterious. He seemed to have an almost childlike enthusiasm for everything.

Other than mathematics, his interests were unstructured and irregular. He spoke not only in German (his native language) but also in French and in a very colloquial English that he'd taught himself. He loved music and played the piano. He loved neorealist Italian films, but then he didn't go to the cinema for twelve years because he was too busy. He read a bit of everything (except mathematical books!) but in a chaotic and sometimes surprisingly 'light' way. He had a very strong interest in eastern philosophies, but his absolute favorite book was *Moby Dick* by Hermann Melville, a copy of which he always carried around with him. Maybe he felt close to the monomaniacal figure of Captain Ahab, and to his search for the white whale. And Melville was no stranger to mathematics.

> *"Halloa! here's signs and wonders truly! [..] I"ll get the almanack; and as I have heard devils can be raised with Daboll's arithmetic, I"ll try my hand at raising a meaning out of these queer curvicues here with the Massachusetts calendar"*

Grothendieck (who was pretty big and, let's remember, had learned how to fight in a concentration camp!) had laid them both out with a couple of well-aimed jabs. He was arrested, but the official who handled his case may have been a math fan, because he recognized him and made sure the charges were dropped.

Another episode. For a certain period, Alexander lived with a little group of 'disciples' around him, one of whom was a Japanese Buddhist monk. The police started to give them trouble, maybe because of Grothendieck's politics, maybe because the neighbors were annoyed. There was a raid at his house, where they found nothing except the Japanese monk, who was blind. From this there proceeded an absurd trial, which exploded in the newspapers as something far worse than what Grothendieck was accused of. His old colleagues were worried and defended him, which irritated Grothendieck immensely. He refused a lawyer, he defended himself (magnificently), but he was convicted. The conviction was overturned, and the story ended up being forgotten.

Despite all this and despite the invitations and the flattery of his old colleagues, 'Schurik' did not backtrack. He found a job as a professor in Montpellier, the university where he'd taken his first steps in 1946. He took a house in a sleepy little town a few kilometers away from the university, commuting by foot or bicycle, and coming to teach lessons once a week, for a miniscule salary. His fame had not dimmed at all, and he was besieged with requests from the world's most prestigious schools. The University of Ferrara, where one of his great admirers taught, offered him a chair of professor emeritus, without teaching duties, with a salary many times higher than the one he got in Montpellier, so that he could have concentrated completely on his research. 'Schurick' refused.

Despite all this, Grothendieck's mathematical creativity showed no signs of letting up during this period. But his publishing method changed profoundly. Rather than scientific

ics you can obfuscate things (especially with statistics!) but in mathematics you can't lie.

Having said this, mathematics is also a competitive sector, in which 'trade secrets' are guarded more jealously than those of a Murano glassblower. The story of mathematics is full of little or big tragedies tied to the paternity of a proof or the solution of a problem. Italy has a very famous one: the story of Gerolamo Cardano is of the general solution of cubic functions. Put that way, it sounds like a silly intellectual quarrel. In fact, it was a story worthy of a roman noir, complete with a murder and the murderer's subsequent execution. Grothendieck wasn't ever particularly 'stingy' with his help to other mathematicians, on the contrary. He made all the work he'd done in his years at IHES available to everyone. But it's as if he knew that this liberality, this generosity would be misinterpreted, that his work would be used for purposes that were far from noble.

Grothendieck had not dominated European and French (and according to some, global) mathematics just to get famous. His imposing personality had convinced many to follow him in one of the most ambitious discovery projects in the entire history of mathematics. The reformulation of algebraic geometry alone had prompted Grothendieck to produce more than 10,000 pages, maybe less than a tenth of those that he produced in his whole life. Like Captain Ahab of *Moby Dick*, his favorite book, Alexander Grothendieck led a motley crew in the hunt for a monster. Now he seemed to realize that the monster had to meet him alone.

Grothendieck's highly political period lasted until the second half of the '70s. The group he'd founded ended up turning against him and marginalizing him. His intransigence, his inability to mediate clashed with active politics. And sometimes 'intransigence' and 'clashing' became literal. In 1973, while he was participating in a pacifist demonstration, two policemen rushed on his female companion meaning to arrest her. A few seconds later they were both on the ground, gasping for air.

H. Melville – "Moby Dick"

With a personality like his, it's no surprise that 'Shurick' (as Grothendieck his friends called him) had a messy private life. He had a son from his first relationship with a woman much older than him who already had two children. When they separated, he entered into another relationship with another woman, by whom he had a son. He was a fascinating person, austere, not exactly a womanizer, but he projected an ineffable charm. He seemed tormented by a secret obsession, a kind of 'spur' that constantly pushed him forward, ever onwards. His mother died of tuberculosis in 1957, still relatively young, leaving Grothendieck in a profound and secret state of guilt that he had not been able to help her. His willingness to help others, on the other hand, was legendary. When not working he was always busy helping this or that acquaintance who'd become broke or lost their home, and his address became a 'refuge' for friends of all kinds, and even for homeless strangers.

In the second half of the '60s Grothendieck was at the pinnacle of his fame. For ten years he'd been working at the Institut des Hautes Études Scientifiques (IHES), one of the world's most prestigious centers of mathematical research. He received the Field medal, the 'Nobel' of mathematics. It is given out every four years, and only for works that the winner has published before the age of 40. It is not, then, 'recognition of a great career ', but a prize for people who are still in their working prime. There is also a significant cash prize attached to the medal. In short, Grothendieck had theoretically 'arrived', having gone from being a stateless, penniless wretch to one of the most important people in the global academic establishment. He could have just held out his hand and gotten whatever he wanted.

But he decided he didn't want to hold out his hand.

The reason for this initial rebellion was politics. 'Shurick' was a radical anarchist, uncompromising, a rigid antimilitarist.

His father had been a revolutionary who'd died at Auschwitz, his mother (in his eyes) was a martyr to her ideals. He didn't want to be anything less. The Field medal should have been given to him in Moscow in 1967. The Soviet government was keeping an eye on western scientists aligned with the left, albeit with the goal of using them. Grothendieck was hostile to both the US Government (because of Vietnam) and to the Soviet Government (because of Hungary and because of the treatment of dissidents). He refused to go to Moscow. The medal was given to him anyway, and he responded by taking the money and gifting it to the Peoples Republic of Vietnam, North Vietnam which had been at war with France for years, and now was fighting the United States.

Upsetting his acquaintances, Alexander went to Hanoi to teach some courses in advanced mathematics. North Vietnam's capital was under heavy American bombardment, Operation Rolling Thunder. Grothendieck seemed indifferent to the danger. When the bombings got too violent, his hosts moved their classes to the jungle. It wasn't a problem for Grothendieck. He dressed as a Vietnamese peasant, wore sandals made from old car tires, and slept on the ground. The math lessons were very advanced, and Alexander hove into the sights of the western secret service, which continued to track him for years. But his Vietnamese visit had an important outcome in that Grothendieck became the rapporteur of the dissertations of Hoàng Xuân Sính, the first important female Vietnamese mathematician and founder of Than Long University, who gained her doctorate under Alexander's supervision in 1975.

Returning from Vietnam, Grothendieck wrote, "Maybe the biggest impression I'm taking home from this trip is the calm faith in the future that I've seen in every person I've been able to talk to. This faith is not a 'face' put on for the benefit of foreigners, but a profound and real feeling that has its origins in their thirty-five year fight for independence for the

Vietnamese people [...]. This feeling wasn't shaken by the fact that the cities and industrial infrastructure of this country were being destroyed by the Americans as the war spread. This experience has shown them that it is possible to lead a rational and socially useful life even in these circumstances.' One gets the feeling that Grothendieck was also talking about his own experience.

In 1970 there was an about-face. Grothendieck abandoned IHES and 'big mathematics'. The casus belli was the discovery that the Institute received a little financing from the French army. It was an act that some call 'ludicrous', but it was serious enough that he abandoned the institute and slammed the door after him. He was 42 and still stateless, because to get a French passport he'd have had to see his name written on the draft list, even if he was no longer very young. He only got one some years later, when the compulsory draft ended. Difficult years were in store for Grothendieck. He founded a group of radical ecologists called Survivre, in which he spoke—one of the first to do so—about the danger of global warming. He threw himself headfirst into political activity, accusing some of his former colleagues of being hypocritical and corrupt. Mathematics, especially in France, was actually a hotbed of radical politics at the time, so Grothendieck's accusation seems gratuitous. But there was more.

The academic environment is what it is, the world over, with its rites, its privileges, its 'barons' and its dynasties. But mathematics at the levels at which Grothendieck worked is practically a world unto itself. In every other branch of knowledge, you can make it by 'faking it', as is shown by the story of Herbert Dingle. In mathematics, at least 'that mathematics', no. There are no half measures, you either know things or you don't, because every time you're called to show your knowledge again. A mathematical proof can't be 'faked', it's true or false. As Sabine Hossenfelder loves to say, with mathemat-