

# Chapter 7

## What Do Scientists Want? Perverse Incentives and Replication Traumas in *Cantor's Dilemma*

### 7.1 Summary

Prof. Isidore Cantor is a biochemist who became a cell biologist and works at a small university on tumorigenesis research. During a nightly visit to the toilet, he has a eureka-experience. His idea is that, because of some mutation affecting the production of arginine (an amino acid named after its bright, silvery-white colouring) certain proteins are suddenly able to move freely in and out of cells (cell membranes normally permit translocation only in one direction). To test the validity of his brain wave, he designs an innovative experiment with tagged proteins as radioactive labels and orders his post-doc Jeremiah (Jerry) Stafford to perform it. Cantor insists on Jerry's complete availability for this research, for he believes it may bring them the Nobel Prize, but this commanding assignment puts substantial pressures on the latter's relationship with girl-friend Celestine Price, a promising biologist, but also a muscular campus athlete who shares an apartment with Leah, a humanities scholar specialised in Bakhtin and dialogism. According to Cantor, to unravel the enigma of tumorigenesis would certainly be a Nobel-prize winning achievement, comparable to climbing Mount Everest or K-2 (p. 37). The analogy between scientific research and mountain climbing occurs several times in the novel and is a well-known trope (Collins 2011; Zwart 2011). Cantor sees his research field as a scientific Himalaya (83) and his project as a scientific Everest (p. 82), while Stafford is referred to as Cantor's Sherpa (p. 37, p. 83). The Himalaya metaphor (with the Nobel Prize as the summit) reflects the dimension of verticality in academic research (Zwart 2014c).

When Stafford finishes the experiment (allegedly successfully), Cantor sends a manuscript to John Maddox, editor of *Nature*, who agrees to bypass the usual refereeing process because it is such a hot topic. No experimental details are given. Their article appears in print within 10 days of the manuscript's arrival, and Stafford learns from Cantor how scientists may tilt the choice of referees in their favour. Adding citations of someone's work, for instance, is likely to lead the journal editor

to select that person as a referee (flattery always helps). But due to this discovery, Cantor (apparently an *impassive* researcher) suddenly becomes a craving subject, driven by the desire to establish priority and secure the prize (p. 61). In terms of university discourse: the confrontation with arginine's role in tumorigenesis (*a* in the upper-right position), destabilises the expert ( $S_2$  in the upper-left position) and produces various symptoms of desire ( $\$$  in the lower-right position) in a seemingly impassive university professor.

For Stafford, Cantor is a lab creature ( $S_2$ ), but it soon turns out that he is not a single-minded researcher who lives solely for his work. He has a second, secret life (and an affluent one at that, because of a calculated marriage). Outside the lab, he lives the life of a gentleman-connoisseur, interested in erotic art, classical music and Jugendstil furniture, playing Boccherini in a string quartet and obsessed with Schönberg, Hindemith and Egon Schiele. In this role, he encounters Paula Curry, a tall, athletic, cello-playing Valkyrie who happens to be Celestine's aunt.

Clouds begin to appear in the clear blue sky when Cantor receives a call from his competitor Kurt Krauss (professor at Harvard) informing him that, although he had put his best post-doc (Yuzo Ohashi, "my Stafford") to work on it, the latter had been unable to replicate Jerry's experiment. Cantor decides that Jerry and he should replicate the experiment together, and apparently this time they are successful, until Cantor receives an anonymous note, an unsigned message, one sentence long, suggesting that Jerry secretly doctored the results: *Why was Dr. Stafford in your private laboratory Sunday evening?* (p. 93). This of course raises Cantor's suspicion. Why had Jerry secretly visited the lab? Cantor faces a dilemma. Should he retract the paper, exposing himself to academic humiliation, so that from now on every colleague will associate his name with fraud, or at least with sloppiness and irreproducibility? Cantor had never withdrawn a published paper before, had never reported unduplicatable experiments. An error of this magnitude would never be forgotten. Cantor decides to perform a second experiment, using a somewhat different design, an alternative route to the top. With the Prize before him and the spectre of withdrawal peering over his shoulder, he disappears into his private lab for weeks, unavailable to the outside world. In the end, all seems to end well. Both versions of the experiment are eventually confirmed, and both Cantor and Stafford fly to Stockholm to collect the Nobel Prize, but this does not put an end to the questionability of their results and the situation remains uncomfortable.

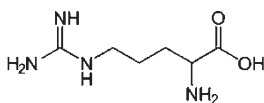
The dialectical structure of the narrative can be summarised as follows. The first moment ( $M_1$ ) is an unexpected idea which allows Cantor to link abstract biochemistry with something relevant and concrete, namely cancer research. But this idea has to be *realised* in an experimental fashion ( $M_2$ ), and this proves a frustrating experience, because the researchers are confronted with a hurdle, with the replication complex as it were. The goal is to overcome this hurdle, to discover the decisive experimental move, so that the abstract idea can be sublated into textbook knowledge ( $M_3$ ), but on the final page of the novel it is still unclear whether this has really been achieved.

Djerassi, the author, is an organic chemist himself, famous for his contribution to the development of the oral birth control pill. Besides that, he authored several

“science-in-fiction” novels and plays. I will now analyse his novel from a Lacanian perspective, using the three dimensions distinguished earlier: knowledge, power and the Self.

## 7.2 Knowledge Production: The Epistemological Dimension

Cantor’s research project exemplifies the trend towards symbolisation in scientific research. It is an effort to capture an existential lifeworld threat (cancer) in biochemical formulas. In cantor’s theory of tumorigenesis, the amino acid arginine plays a crucial role:



If cancer can be tamed via biochemical means, with the help of a structural formula, the medical challenge can finally be addressed. Thus, the *knowledge* dimension adheres to the structure of university discourse:

$S_2$	$a$
$S_1$	$\$$

Cantor is the qualified expert ( $S_2$  in the upper-left position of the agent) who, by introducing biochemical expertise into cell biology, suddenly seems able to discover the decisive factor which allows him to unravel the cancer enigma, focussing on *arginine* (the object  $a$  in the upper-right position). This endeavour is driven by a secret, latent objective, however, which suddenly seems to come within his grasp, and even becomes a manifest goal at a certain point, namely to reach the summit, i.e. to receive the Nobel Prize. In other words, a displacement occurs, as silvery arginine (the initial object of desire) gives way to a golden medal ( $a \rightarrow a$ ): the Nobel Medal, together with a Nobel Diploma and a document confirming the fee, handed to the laureate by the Swedish King ( $S_1$ ). This prospect (the distinction received from the hands of the King, representing the dimension of verticality) is the decisive push, causing the researcher to become trapped in the matheme of desire ( $\$ \diamond a$ ).

The Nobel procedure as such represents the discourse of the Master in the novel. The Nobel Committee is an authoritative voice ( $S_1$  in the upper-left position), its verdicts are unquestionable and undebatable ( $\$$  pushed into the lower-left position), while allegedly impassive scientists, acting as recipients ( $S_2$ ), prove highly susceptible to such incentives. This chronic pressure or conflict of roles, namely between Cantor the stoic, *impassive researcher* ( $S_2$  in the position of the agent in university discourse) and Cantor the *potential Nobel laureate* ( $S_2$  in the position of the recipient

in the discourse of the Master) produces the brainwave: a moment of *jouissance*, revolving around arginine as the object *a* (in the lower-right position):

$S_1$	$S_2$
\$	<i>a</i>

But to realise this ambition, Cantor has to revert to university discourse again, placing himself as a qualified expert in the position of the agent ( $S_2$  in the upper-left position) who puts his theory to the test by performing an experiment, designed to tame the object *a*, focussed on proteins containing arginine (*a* in the upper-right position), a target which proves more intractable and recalcitrant than expected, resulting in doubts, suspicions and even panic (\$) in the lower-right position):

$S_2$	<i>a</i>
$S_1$	\$

Initially, however, rather than playing this role himself (rather than allowing himself to be exposed to these frustrations and risks), Jerry Stafford is placed in this position (facing and interacting with the object *a*), so that Cantor can keep his stoic distance. Stafford has to face the challenge of realising the masterful idea in a hands-on fashion. He has to capture the recalcitrant target via experimental dexterity, but there is always the possibility that arginine is actually a lure, resulting in frustrations and despair (\$) in the lower-right position).

From the very beginning, there is a clear division of labour between Master and Servant. Cantor acts as the Master, the gentleman-scientist who conceives the idea, designs the experiment and writes the article, reaping the fruits of Stafford's labour, while the latter is doing the actual lab work. As soon as Stafford has finished the exacting experiment, Cantor quickly goes through the key data. He is jubilant ("we did it", p. 56) and decides to write the paper himself. But he does not consult Stafford's laboratory notebook, the actual record of his toilsome labour. He disregards the tension between context of discovery (backstage, the realm of the Servant) and context of justification (frontstage, the realm of the Master). But an experiment in itself means nothing: it is only meaningful if it can be repeated (replicated) by someone else elsewhere. When the competing team at Harvard fails to replicate the trial, he requests Stafford to write up the experimental details in full, because they may have missed some essential technical detail, some missing step or link, but this does not help (p. 110). He even considers sending Xeroxes of Stafford's lab notebooks to Kraus, but to his embarrassment he discovers that Stafford's notebooks are actually rather sloppy, so that there are too many details missing. This situation is frustrating for Cantor (the Master), but also for Stafford (the Servant) and the second part of the novel is basically an account of Stafford's efforts to *emancipate* himself from the Master, but we will come to that.

In a self-reflective mood, during a conversation with Paula Curry, Cantor confesses that scientific research is not as straightforward as is sometimes suggested. Most scientists suffer from what he refers to as a “dissociative personality” (p. 113). On the one side, they are rigorous believers in the experimental method with its set of rules, bent on advancing knowledge (in other words:  $S_2$ ). On the other hand, they remain fallible human beings with all the accompanying emotional foibles (in other words:  $\$$ ). One of the gravest occupational hazards in science, moreover, is simultaneous discovery. Sooner or later, somebody else will have the same idea. Scientists are driven by one desire: recognition by their peers (the Krausses of this world), but in order to obtain recognition, priority is essential. To score a Nobel Prize, one has to be the first to reach the summit. Thus, the push for priority is enormous. And the only way to establish priority is to be the first to publish. In other words, due to the confrontation with arginine (the object  $a$ ), the self-contained expert ( $S_2$ ) falls victim to disruptive desire, and this results in a split (*Spaltung*) between adherence to methodological safeguards ( $S_2$ ) and the desire to maintain his advantage, his momentum, so that Cantor’s eagerness to score ( $\$$ ) suddenly seems to overrule his impeccable technique. Krauss is Cantor’s scientific conscience or superego. If the experiment proves impossible to replicate, Krauss may accuse him of sloppiness, or even fabrication: “Surely he is not calling you a –. Paula stopped short”, p. 109). And once someone’s credibility in science is damaged, it can never be repaired. The only option left to Cantor is to do the experiment himself, to become his own Servant as it were, and to design a second experimental test, climbing Everest by a different route (p. 116). Because he cannot trust Stafford anymore (p. 113), he has to take the experiment literally in his own hands, doffing his costume for a lab coat. It is only via working through that the methodological requirements and desire for recognition can be reconciled again.

Various instances of self-reflection can be discerned on the epistemic level. In his Nobel speech, looking back on his experiences, Stafford suggests that the failure of the Harvard team to replicate the results was due to a procedural discrepancy that was “really quite trivial”, adding that “if there is one lesson to be learned from this experience, it’s that even the smallest details should be put in one’s notebook ... You never know which details may turn out to be crucial” (p. 198). This self-reflection not only concurs with the principles of experimental methodology, but also with the psychoanalytic rule that one should report any observations; that one should take care not to exclude any of them, for in principle nothing is *irrelevant*. Even seemingly trivial details (the bagatelle) may prove to be highly significant (Freud 1917/1940, p. 297).

But in the novel, the role of the analyst, listening to the dialogues (the flow of university discourse) with evenly-poised attention, and from an oblique perspective, falls to Leah, the expert in Bachtinian analysis (p. 82). She is not at all interested in proteins, membranes or arginine, but rather in the grammar of biomolecular discourse. When challenged to share her observations (by Jean Ardley, Leah’s supervisor, who happens to visit them), she points to the remarkably role of the term “we” in experimental discourse. Why do scientists always use the *pluralis majestatis* (“We, scientists”, “We, the authors”) when speaking about science? What is wrong

with the first person singular? Who is this “we”? From a Lacanian-Bachtinian perspective, it is clear that the “we” functions as a grammatical operationalisation of  $S_2$ : the replaceable, un-subjective, decidedly *impersonal* subject of science. But it also covers up the exploitation and expropriation of the servant by the Master (“We, the Master, did this”). And Leah’s therapeutic intervention proves effective, for from now on, Stafford begins to pay attention to Cantor’s use of the term “we” (or “our”), which suddenly may give way to “I” or “mine”. For instance, he now notices that Cantor informs him that the Krauss team is having troubles repeating “your” experiment, and that there may be something the matter with “your” notebooks, while he consistently speaks about “our” *Nature* article. In the latter case, there is “no ambiguity about *our*” (p. 89). In other words, Cantor uses the “we” in such a way that he may safeguard his intellectual property rights, while attributing any experimental flaws to his assistant. From now on, Stafford begins to pay attention to (and even count) Cantor’s uses of the signifier “we” (p. 83). Indeed, the use of the signifier “we” proves highly symptomatic and, from the point of view of critical discourse analysis, a fascinating object of research.

In response to Leah’s intervention, Celestine’s supervisor makes a telling confession. At a certain point in her career, she decided to change her name from Yardley to Ardley, in view of the importance of alphabetic order in the listing of author names:

Let me confess something to you ... but promise not to spread it around ... When I was a senior at Brown [University] – and a very ambitious one, almost unpleasantly so – I paid very much attention to where my name would ultimately appear... To my father’s shock, I announced one day that I would change my name from Jean Yardly to Jean Ardley... Yes. I went to the courthouse and did it legally. It’s best to be first, it’s been true since prehistoric times (p. 51).

She suppressed (sacrificed) a letter (“emasculated” her surname as it were) to further her career in science, in terms of academic authorship, emphasising that the subject of science is subjected to anonymisation anyway (so that a surname becomes something quite functional, something impersonal, allowing other experts to retrieve journal articles, or to assess citation indexes as performance indicators). This is exemplified by “the most anonymous of all appellations: *et al.*” (p. 83).

### 7.3 The Power Dimension: Cantor’s Sherpa

The power dimension is noticeable in various ways, for instance in terms of the hierarchy between top universities (such as Harvard, Berkeley or MIT, represented by Kurt Krauss, where Nobel Prizes come in every few years) and mediocre institutes of smaller scale (such as Cantor’s university). But it is notably evident in the power relationship between Master and Servant, between Cantor (the professor) and Stafford (his Sherpa), or even (as Paula phrases it) his “slave” (p. 80). For indeed, although Cantor refers to his junior researchers as “collaborators”, Celestine Price

and Paula Curry straightforwardly refer to them as his "slaves" (p. 80). This is exemplified by the following dialogue between Isidore Cantor and Paula Curry:

"Late in the Fall I thought of an experiment ... and I put my best young collaborator on the project".

"One of your slaves".

"No, one of my collaborators... I basically told the man that he had to finish the work in three months... We published the work"

"We?"

Cantor looked puzzled. "Yes, we. Why do you ask?"

"Well, if he did the work, why did you publish it with him?"

"God, Paula, we do have a cultural gulf to bridge... Let me just assure you that in science it's *de rigueur*. I thought of the problem and the solution, *he* did the actual work, and *we* published it together. That's how it's always done" (p. 107).

An important aspect of his position as Master is that, although from the perspective of his junior collaborators he seems wholly devoted to research, he actually leads a double life, as we have seen, a secret life as an affluent, high-brow gentleman. In his spare time, he engages in high culture, as an erotic art connoisseur for instance, being the owner of seven original erotic drawings by Egon Schiele. We learn that Cantor inherited a fortune from his father-in-law – a wealthy Jewish industrialist from Vienna, whose only daughter Cantor had married when she was thirty-six – and this heritage included a complete art nouveau interior, a fin-de-siècle Viennese decor, transplanted to Chicago, whose most remarkable item is a seating machine (*Sitzmaschine*). But this sample from Viennese existence is now embedded in the American way of life and combined with a splendid view over Lake Michigan.

In the course of the novel it becomes clear that Cantor's actions are much more calculated, strategic and self-centred than is initially apparent. The race for priority (and indirectly for the Nobel Prize) is much more important to him than something like scientific "truth". And Cantor is quite good at playing the publication game. At a certain point he deplores the abolishment of the *pli cacheté*, the "sealed envelope" system (p. 62), a reference which requires some explanatory remarks concerning the history of the scientific journal which, originally, was not invented as a communication device, but as a device for solving priority conflicts (Zwart 2001). By establishing formal outlets in the form of journals, discoveries could now be attributed to the scholar who first published about it, or whose paper first reached the editor of an acknowledged journal. And the "sealed envelope" procedure meant that an article could be submitted so that a journal editor, who would date it upon receipt, but would refrain from opening it until the author was sufficiently certain that its content could be validated and replicated, or when a competitor was about to publish something similar. In that case, the original submission data of the *pli cacheté* would demonstrate priority. If still in place, it would significantly reduce the risk of retraction, and it would certainly have solved Cantor's dilemma. But it would also turn publishing into a kind of card game, with the sealed envelope functioning as a kind of trump card. "I wonder what made me think of the *pli cacheté* system", Cantor asks himself, "I hope it's not some unconscious wish of mine" (p. 63).

From a Lacanian perspective, one could argue that the sealed envelope system demonstrates the extent to which the fate of the scientific subject may come to

depend on the “itinerary of the signifier”, already discussed in Chaps. 3 and 6 (1966, p. 12). The content of the sealed envelope is unknown, in principle quite significant, but potentially quite embarrassing, because its claims may prove false (which is precisely why it must remain sealed until further notice). The scientist has dispatched a “signifier” (i.e. a certain scientific claim, made in writing, whose content is no longer modifiable) which is now deposited in the hand of someone else (the editor), like a playing card ready to be shown, to be put on the table, as soon as the occasion to do so presents itself, or the instruction to do so is given. It is up to the author to decide whether and when the card will be shown. Others only know *that* a claim is made, but are unfamiliar with the secret content of the claim, thereby demonstrating what Lacan refers to as the priority of the signifier over the signified. Rumours concerning the content of the submitted envelope are likely to *precede* its disclosure. Indeed, for Lacan, the content of the sealed envelope is a “signifier”, determining the fate of the subject sooner or later, thereby exemplifying what Lacan refers to as the *primacy* of the signifier. But others may have deposited similar claims of course, whose exact content is equally obscure. The signifier has primacy because the fate of the scientific competitors (in terms of recognition by peers) is already literally sealed. In this manner, the race for priority indeed becomes a kind of game, and Cantor’s dilemma becomes a prisoner’s dilemma. The research teams involved (Cantor versus Krauss) are kept “in solitary confinement” in their labs, unable or unwilling to share or communicate their exact findings. If you submit your envelope sooner, you may claim priority in case you happen to be right, but the chances that your results will prove inadequate or non-replicable will also be greater. So, yes, Lacan would argue, Cantor’s reference to the *pli cacheté* system most certainly reveals an unconscious desire. In fact, his unconscious already set this game of cards in motion (namely during the toilet scene) before he consciously became involved in this race for priority. If you want to lay claim to the Nobel Prize (even if you are still uncertain whether your claim is really true or false), there is an opportune moment to submit. In the case of *Arrowsmith*, the decision to postpone submission equalled academic suicide. In other words, what Cantor’s unconscious tells him is that the Nobel Prize (the *gold* medal, the “perverse incentive”) is really his object *a*, eclipsing even the *silvery* amino acid arginine (the official target of his research). The only problem is that (contrary to the prisoner’s dilemma or the *pli cacheté* system), Cantor has to lay his cards on the table straight away, in the form of his *Nature* publication. And yes, his unconscious certainly has reasons to deplore this. Whereas the sealed envelope would have given him an advance (meanwhile checking his results), the current system entails a handicap because now, retraction can no longer occur discretely and the card that is now on the table for all to see can easily be trumped by competitors like Krauss.

Cantor not only plays card games with competitors like Krauss. His most decisive card game concerns his relationship with Stafford, his associate. It begins with the co-authorship card, which buys him Stafford’s diligence and labour, while he remains the corresponding author himself (firmly keeping the trump card in his hands as it were). But their card game takes an unexpected turn once the Nobel Prize is awarded to them. With some difficulty, Jerry manages to meet Cantor (now