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

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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.

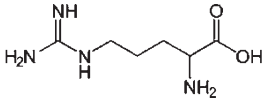
The dialectical structure of the narrative can be summarised as follows. The first moment (M_1) is an unexpected idea which allows Cantor to link abstract biochemistry with something relevant and concrete, namely cancer research. But this idea has to be *realised* in an experimental fashion (M_2), and 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 ($\$ \lozenge a$).

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
$	*a*

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	*a*
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 care 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 and 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

suddenly famous and besieged by the media) in private, announcing that he has a confession to make (p. 152). Apparently, he wants to lay his cards on the table. Jerry tells Cantor that "he" cannot accept the Nobel Prize (card game terms: that he has decided to pass), but Cantor retorts that he is not authorised to make such a decision by himself. The prize was awarded for what "we" published in *Nature*, not for experimental work conducted by a post-doc and proving somewhat difficult to replicate. Once the card of the Nobel Prize is played, it cannot be repealed or refused. Even Sartre (who refused the Nobel Prize for literature for ideological reasons) is still on the list of Nobel laureates. In response to Stafford's reluctance, Cantor decides to deal the cards (to divide the roles) as follows: while Stafford will be allowed to speak first, to cover the theory, Cantor will subsequently describe his "second" experiment, so that all scepticism concerning Stafford's "first" experiment will be trumped. But Stafford is less frank or naïve than Cantor suspects, and is actually holding his cards close to his chest. There is a secret hidden in the sealed envelope of his Nobel Prize speech.

Initially, everything seems in order. In the main aula of the Karolinska institute, Stafford announces that they will present their work in chronological order, starting with the "theoretical construct" (p. 197). The slides of the presentation are like playing cards, and initially, Stafford puts his cards on the table as expected. But then, suddenly, his tone of voice seems to change: "Let us now turn to the relation of theory to facts… A theory cannot be proven but only disproved. In other words, it must be tested experimentally…Therefore, I would now like to address…" (p. 198). Until now, Cantor had been quite relaxed, but now his "mental radar started to detect the first blips of irregularity. Was it the use of the *first person singular*?" (p. 198; my italics) The "I" form (the use of the first person singular here) is symptomatic and indicates that Jerry suddenly plays his trump card. Actually, he has two surprises in store for Cantor. The first one is that he presents a detailed account of his first experiment. And the second is that, apparently, but unbeknownst to Cantor, this experiment has now finally been replicated by Dr. Ohashi (the post-doc at Krauss's lab at Harvard), so that Cantor's second experiment, as well as his Nobel speech, become quite irrelevant. Initially, there were problems repeating the work, Stafford admits, but when each step was scrutinised carefully, the discrepancy was finally discovered. In addition to the experiment as reported, there are always hidden instructions, apparently trivial details, which may become significant after all, so that "even the smallest detail should be put into one's notebook" (p. 198). Meanwhile, Stafford continues,

> …we had conceived a second test… which is now under scrutiny in Professor's Krauss's laboratory. I have no reason to doubt that it will also be replicated… So we actually have two independent tests in support of our theory. I trust that none of you will consider this just a superfluous crossing of a *t*, the unnecessary dotting of an *i*. After all, 'tumorigenesis theory' has two *t*'s. And the work itself was performed by two *I*'s: myself, and then Professor Isidore Cantor. He will now tell you about that second experiment (p. 199).

And with this little trick (his trump card) emphasised by the resurgence of the "I", or rather the splitting of the "we" into two *I*'s, Stafford quite subtly transforms the magnificent professor Cantor into "just another scientist" (p. 199). Via this oedipal

gesture, Jerry emancipates himself from his "father", – and is now able to marry Celestine: happy ending of a Nobel fairy tale.

And it is only now, in the aftermath of this event, that Cantor is finally able to ask the question which he should have asked much earlier:

> "Jerry, what did you do in my lab on that Sunday evening? The day before we completed the experiment together."
> Stafford looked up. "How did you know I was there?" (p. 202)

Stafford confesses that he added some additional enzyme to the incubate, and that he had wanted to tell Cantor, who was too preoccupied to hear him out. Cantor, however, is still dissatisfied. The experiment was allegedly repeated successfully at Harvard, but this happened – while Stafford was also there. Somehow, the success of the replication continues to depend on one decisive factor: Stafford's presence. Facts are fabricated in the lab, facts are laboratory artefacts, but to exclude "fabrication" (in the pejorative, FFP sense) an independent test is required, and this criterion had still not been met, so that fraud could still not be excluded.

7.4 Experimenting and Publishing as Practices of the Self

At a certain point in the novel, Leah (the discourse analyst) scorns scientists for being so secretive:

> Don't you know the Latin root *publicare*, 'to make generally known'? What *do* scientists want? (p. 66)

The latter sentence may be seen as referring to the famous Freudian adage "What does a woman want?" ("Was will das Weib?"), the one question Freud confessed he was never able to answer satisfactorily (Jones 1953, II, p. 421). Building on what was discussed above, the answer to the question "what do scientists want?" may seem obvious. They want to secure their claim to priority, and therefore they want to publish (and be the first to do so). But why, then, has scientific publishing evolved into such a complicated card game, involving multiple variations on the prisoner's dilemma? To successfully address this question, we must take a psychoanalytic stance, because than we will realise that some less obvious meanings, some less praiseworthy associations are obfuscated by the standardised use of this term "to publish" in university discourse. For instance the connotation that to "make publish" etymologically means *to confiscate* (by the public authorities). In other words, as soon as you publish, your intellectual property is turned into *common* property, and scientists may therefore be reluctant to *give themselves away*. As long as some material is unpublished (safely stored in a computer, or kept in a *pli cacheté*) it is still yours. Another intriguing association, psychoanalytically speaking, is connected with this one, namely the pejorative sense of the Latin term *publicare*. A *publica* or *publicus* is actually a prostitute, someone who is at everyone's disposal. So, yes, there certainly are reasons for ambivalence or even reluctance when it comes to publishing your results or your ideas in academic journals. By making

something (by making yourself) public, you give up your control over your "body" of work. This was, as already noticed, the benefit of the "sealed envelope" system, which allowed the author to make a claim without giving "it" (giving himself) away. Yes, scientists do want their websites to be visited and their work to be downloaded and their thoughts to be known, but to *publish* also implies that you are putting your integrity at risk. For as soon as your work is published, there is the possibility of exposure, perhaps even resulting in retraction, hovering like a sword of Damocles over the academic author's head, as a potential dead blow to his or her academic prestige. Publishing your results means that they are formally confirmed (formally acknowledged) by the academic symbolic order, but others may then use these publications (never flawless) to damage your reputation, especially if you try to fly too high (the dimension of verticality). But if you wait too long, until your material is flawless, you may be passed over, like a beautiful soul, as happened to Martin Arrowsmith. This world of meaning is looming beneath the seemingly neutral and unproblematic verb *publicare* as well as behind the question "*Was will der Wissenschaftler*? (What do scientists want? What is the desire that is spurring them on?)".

The wish of the "normal" scientist is to contribute to the knowledge production process, by representing a reliable, self-composed form of agency (S_2 in the upper-left position). But Cantor, in his fixation on arginine, and subsequently on winning the Nobel Prize, becomes exposed to "the object a", falling victim to the matheme of desire ($\$ \lozenge a$). The Nobel Prize is a symbolical entity which transcends the structural formula of cellular biochemistry, causing a split ($\$$) between fidelity to scientific methodological requirements on the one hand and desire for recognition on the other. The Nobel Prize exemplifies the primacy of the signifier, structuring the symbolical realm of science. The Nobel Prize as such (i.e. the Master signifier, S_1) becomes and end in itself, more important than the actual content of the research (the signified). The Nobel represents the summit of the symbolic order, that which is always already there, but may suddenly come into view and within reach, a disconcerting, destabilising experience. As Paula Curry phrases it, just before Cantor is awarded the Nobel Prize: "You're a complicated man; a man of many parts… I want to know what binds together your various personalities. And now, just when I think I'm beginning to understand you, something comes unglued" (p. 139). This split (*Spaltung*) between multiple personalities (suddenly unglued) is the by-product of laboratory life, of university discourse ($\$$, the divided subject, in the lower-right position). It is a contemporary version of what Von Liebig (in a letter to his friend and colleague Wöhler) referred to as the *hysteria chemicorum*: the occupational disease of chemists, due to toxic laboratory conditions. In contemporary laboratories with their clean environment, however, the toxic substance has become toxic in the symbolical sense of the term, as research practices become contaminated by perverse incentives.[1]

[1] And he is not alone in this of course. His rival Krauss confesses to the vice of "salami publishing" (p. 205), i.e. slicing findings into multiple publications to increase output and impact.

Jerry Stafford follows a different trajectory, moving in the juxtaposed direction. Whereas Cantor initially seems self-composed but gradually "comes unglued", as Paula Curry phrases it, Jerry Stafford increasingly manages to pull himself together and recover his integrity. Initially there is an embarrassing tension between his actual practice (the sloppiness of his research, his notebooks, etc.: the context of discovery) and the exacting expectations of Cantor as his super-ego. The latter is not really interested in the actual work conducted by Stafford, he is focussed on the results (the surplus value, in Marxist terms), but when the Harvard lab fails to replicate the experiment, he decides to photocopy and xerox Stafford's notebook to Krauss. For Cantor, there is nothing improper in copying Stafford's notebooks, because a scientist's laboratory journal is not a personal diary, but rather intended for inspection by others on demand. But as he himself examines Stafford's notebooks just before sending them off, he is disconcerted by what he finds in them, or rather: by what he *does not* find in them, for the actual details are surprisingly scant (p. 86). Too much is missing. Therefore he refrains from sharing them with Krauss (realising that he failed as a supervisor) and decides that they should do an experiment together, so that he can monitor Stafford's doings, and supervise him *in situ* (as an embodied conscience):

> We'll repeat *your* [sic!] experiment together… In my private lab… Everything will be under control… A minor but crucial experimental variable must be responsible…You'll do every step in my presence…We'll find what was missing in the report… Right into the lab and start… [Stafford] had now been ordered to repeat his spectacular experiment under the watchful eyes of the master (p. 92).

And indeed, the assay comes out as expected, with an arginine level which is significantly higher than that of the control (Krauss's group at Harvard had been unable to repeat the Cantor Stafford experiment, but "*we* [sic!] have done so now", p. 93). But the scenario falters, as we have seen, when Cantor is anonymously informed (by a jealous colleague, or a whistle-blower) that Stafford secretly visited the lab on a Sunday, after hours. From now on, Stafford is de facto a distrusted suspect, a potential fraud ($S_2 \rightarrow \$$), or as Cantor phrases it, to explain himself to science-illiterate but erudite Paula: "It's a bit like Othello. Once the seed of suspicion is planted…" (p. 140). Stafford is no longer allowed into the lab, for because of this suspicion, everything he touches becomes symbolically contaminated. But from Jerry's perspective, his sloppiness should not count as fraud ("I had just gone home when suddenly I realised that earlier in the day I had added too little kinase. So I returned to the lab, and added some more enzyme. I don't think it was really fudging… I just made up for it", p. 149).

In Stockholm, by way of compensation or reparation (*Wiedergutmachung*), Jerry announces that, instead of pursuing a promising career in science, he will step back and return to medical school, to earn the degree of Doctor of Medicine, in order to explore clinical implications of tumorigenesis research (the *Arrowsmith* scenario as it were). In other words, also in an ethical sense, he seems bent on overtaking Cantor, for the latter never considered practical implications at all, being solely obsessed with winning the Nobel Prize, for which he saw tumorigenesis research as purely instrumental.

To summarize: eventually the novel becomes a podium for the unfolding of the discourse of the analyst:

a	$\$$
S_2	S_1

This type of discourse starts off with the question raised by Leah, who indeed plays the role of psychoanalyst in the novel,[2] namely: *Que voi?* What do scientists want (p. 66)? Initially, their *cupido sciendi* is bent on symbolisation: replacing the physical, phenomenal suffering of cancer patients by the noumenal, structural formula, for instance concerning "silvery" arginine ($C_6H_{14}N_4O_2$). For Cantor, however, the ultimate trophy is something even more symbolical, namely the gold medal, the Nobel Prize (that which pulls him into action: *a* as agent, upper-left position). This alluring entity provokes him and transforms him (the allegedly self-composed professor) into a craving subject, suffering from *hysteria chemicorum*, but in a contemporary form: the tendency of researchers to forget or disavow their vocation, the constraints of their profession (S_2 now in the lower-left position), so as to give in to "perverse incentives" (coming from *a*). His counterpart Stafford, perhaps disillusioned by the realities of laboratory life, moves in the opposite direction: from the noumenal, symbolical world of chemical formula and academic credits back into the "real" world of biomedical (evidence-based) health care. The by-product of the narrative is a normative lesson (S_1 in the lower-left position). As the author argues in his *Afterword*, although the science in the novel is fictitious, the ethics (the questionable research practices, such as data trimming, data smoothing, etc.) is not (p. 229). And the primary goal of the discourse of the analyst is normative insight (finding out the truth concerning your desire).

[2] "A small dose of psychoanalysis wouldn't hurt you before you make up your mind", advised Leah (p. 119).