

PREFACE

An Interview with Myself

The idea of writing an intellectual memoir never occurred to me. Yet here it is. It started with a long, in-depth interview. There is nothing unusual about it, except that it took place on a splendid summer afternoon. The sun was still high, but the heat started to retreat. From the terrace one could see the beach crowded with the typical mix of people; those who would soon get up to catch the train bringing them back into their urban habitat, and those who would later meet their friends for an aperitivo or host them for dinner in their summer house. Beyond the beach was the sea—one of the innumerable beautiful coastlines of the Mediterranean, shaped by the waves gently caressing the stones, sand, and rocks, just as they had done during the summer months for thousands of years.

My guest and I also had an appointment for a dinner later in the evening. Before, we engaged in what we had planned some time ago: a long interview to appear in the journal *Sociologica*, “Helga Nowotny in Conversation with Elena Esposito” (Esposito 2019). We spoke about

my work and life, my scientific biography, the role of technologies in the ways we experience time, the organization and funding of science at EU level, the ongoing transformation of the research system, and we touched on gender issues—aptly summarized in the abstract that precedes the published interview. I had known Elena for some time, and we had planned to meet when she was a Fellow at the Wissenschaftskolleg zu Berlin, WIKO (see p.16), the most prestigious Institute for Advanced Study in Europe. I know the WIKO well, as I had been there in the first year of its existence, a genuine “Ur-Fellow,” followed by short-term returns, and can confirm that it is unmatched in the generous academic working conditions it provides for those fortunate to spend a truly unforgettable year on its premises. But my short stay with Elena came to nothing. Like so many other events, it had to be cancelled due to the COVID-19 pandemic.

The interview with Elena lays out the grid of my scientific trajectory, and I will take the liberty to borrow amply from this source. But an intellectual memoir differs from answering questions posed by an interviewer with whom one establishes a face-to-face communicative bond. I remember many good and bad interviews. Depending on the nature and purpose, the interviewer seeks to elicit from the interviewee the information looked for. This may simply consist in obtaining a soundbite or an authoritative confirmation of what the interviewer wants to hear. An interview is intended for a specific audience which shapes content, form, and the language used. Every time, I am surprised how much the outcome depends on the personal interaction that arises in the conversation—and how unpredictable it is. With Elena it was excellent—but how different is it from writing an intellectual memoir?

This time, there is no external interviewer. Rather, I am interviewing myself. This may sound stranger than it is, but it remains a peculiar situation in which I engage in a sympathetic and deep conversation with

myself—and I claim that nobody knows me better than I do—while keeping a cool, analytic distance at the same time. I strive for a good balance between my role as interviewer and as interviewee. I am guided by the sense of what may be relevant for an audience I barely know, but it also must be meaningful for me. Above all, the outcome must satisfy my criteria of internalized quality standards. If not, I have only myself to blame.

The communicative structure of an interview consists of questions and answers which shape the conversational flow and moves it forward. Questions can be good or bad; clever or stupid; mean or supportive. They can be to the point or vague and even toxic, depending on the objectives of the interview and how it is framed. In a cross-examination, interviewer and interviewee are at opposite ends by design. Another situation arises when journalists try to extract information from politicians who have been coached what not to say with many empty words. In what follows, I will try to be as honest and open with myself as possible. Inevitably there will be gaps, some imposed by space, others because I do not consider them to be relevant.

An intellectual memoir has a defined objective. It is not “a life,” a biographic genre so dear to the British, and I have little to say that is not directly or indirectly related to what has been driving me to do the work I have done. An intellectual memoir seeks to dig deeper into the connections that are not obvious. It attempts to unearth guiding concepts, their origins and relations among them, why they turned out to be fruitful or obsolete. It may even aim to shed some light on the origins of these concepts and why they took on the importance they achieved. An intellectual memoir dwells on methods, instruments and working conditions, on who influenced whom, and on the intellectual and academic networks that provide support. Ideally, it should result in an intellectual portrait that brings to life the numerous contingencies

that shape a life and work, from one's upbringing and early and later education to those achievements that justify the interest in a person's trajectory. In my case, it will also touch what it means to be a woman in science.

Good questions are of overall importance, but what makes a good question depends on the context. Posing a good question is an art and is surprisingly rare.¹ A good question can pry open what was closed before, render visible that was invisible, lead to a switch in perspective or discover a new angle for what had been taken for granted. It may act like a slow burning fuse, linger in the mind of the listener without having been answered, but refusing to go away. These are the questions that point to something beyond seeing the world as it is, because they carry the subversive message "it could be otherwise" (Nowotny 2000). Often, these questions contain a normative dimension. They matter, because they alert us to the many contingencies in our lives and even those of societies, while focusing attention on what might serve as a compass for navigating troubling and confusing circumstances. They widen the space of the imagination and push us to confront the relationship between what the Austrian writer Robert Musil called the "Möglichkeitsraum" and the "Wirklichkeitsraum," the space of what is possible and the space of what is real. Playing at the shifting interface between them enables creativity to emerge and innovation to occur, as scientists and artists know very well.²

1 It has become customary for the speaker in an academic conference to thank the questioner from the audience with "this is a very good question." In practice, this is only the polite acknowledgement that the question is easy to answer, offering the speaker the opportunity to confirm their brilliance.

2 According to Stuart Kauffman's Theory of the Adjacent Possible, the evolving biosphere and every existing organism create new possibilities, find new functions, and uses that cannot be predicted (Kauffman 2002). For Brian Arthur,

For research to be productive it is essential to begin with a good question. It functions like a flashlight, in search for a promising path in the darkness of the still unknown ahead. Asking a good research question gives focus to the search and although fundamental research is inherently uncertain, it provides a guiding sense of direction and stimulates the excitement to explore what is yet unknown. To find the way and to move on, curiosity, passion, and perseverance will be needed. A good research question hovers on the edge between knowledge that is already ascertained and new, emerging knowledge. It is but the beginning of what often is a long and tortuous road before this new knowledge will be validated, accepted, and turned into knowledge that is certain, although in science all certain knowledge is always only preliminary. It will be modified, superseded, expanded, incorporated, and replaced by more and better knowledge. But there is nothing like the excitement of the beginnings, of finding something that seemingly nobody had found before.

In my book *Insatiable Curiosity: Innovation in a Fragile Future*, I have explored curiosity as a trait that humans share with other organisms, although only humans have language to express it. It is not always welcome and the *libido sciendi*, the lust for knowledge, repeatedly has been forbidden or restricted by religious and secular authorities. Curiosity is one of the driving forces behind scientific activity and the arts, but often it solicits ambivalent reactions. Contemporary societies are obsessed with the “quest for innovation,” which is society’s response to the uncertainties that come with the acceleration of scientific-technological advances. While science and

the origins of evolution of technology and hence innovation are the outcome of combinatorial evolutionary processes, whereby existing parts are combined in novel ways, fusing experience and knowledge (Arthur 2009).

the arts need autonomy to flourish, many efforts are deployed to channel their creative potential in desirable and wanted directions. This is the taming of curiosity by society that generates new tensions that are difficult to resolve. Human curiosity is insatiable as especially the scientific and technological possibilities are immense, but also due to the insatiability of human wants and needs, leading to the craving for more in material, cognitive or emotional terms (Nowotny 2008).

Students working for a Master's thesis, or a Ph.D. thesis / dissertation, often have great difficulties in finding and formulating the question that drives them, and academic teachers often fail to prepare them sufficiently well to nurture their curiosity (Grossman, Jackson, and Nowotny 2020).³ As a thesis supervisor, I had to push hard, especially my Ph.D. students, to come up with a question to which they could relate beyond having it entrusted on them from outside. If they want to follow their own path, they must learn to think for themselves, beginning with the questions "what do I want to know"? and "why do I want to know this"? Intrinsic motivation matters and so does honesty: why am I interested in this question, where does this interest come from and, perhaps even: what has it to do with me? Those wanting to pursue a career in research must learn to be persistent. Inevitably, there will be times of utter frustration. "Nature does not easily yield its secrets," as the natural philosophers put it in the early days of modern science. Great scientists in our midst today succeeded despite the odds.

3 Writing the Afterword for the book, I was struck by the urgent emphasis to (re)introduce the study of curiosity into the classroom and academia in the United States and to let students practice their own curiosity while guiding them to reflexively analyze where it leads. If the only goal of education is to equip students with the aspiration "to get a job," the scope is dangerously narrowed, leading to what some call the system of being broken.

They were passionate, even obstinate, and continued to pursue the questions that drove them. Yet, without the will and strength to persist, they would not have been able to achieve getting the answers nor—finally—be rewarded with the Nobel Prize.⁴

Good questions can be good enough questions. In what follows I will elicit the underlying themes, concepts and questions that undergird my research and how they hang together. My academic trajectory is marked by the contingencies of my life and blessed by the privileges that academia still holds, despite the vulnerabilities and precariousness to which the younger generation are exposed today. Not that I did not also experience periods which were full of doubt and insecurity. But I was lucky to belong to a cohort convinced that the world is open for them. We were full of confidence that in case one prospect did not work out, there were always other tempting options worth to be explored.

Today, this kind of confidence into being able to find one's future seems to have vanished in many parts of the academic world. Depending on time and place, and on the national, economic, cultural, and political context, it has been replaced by different kinds of imaginaries and projections, but also by despair, often shrouded in what has become an involuted, and sometimes tortuous search for identity, aggravated by “woke” and “anti-woke” politics (Lamont 2023). I am convinced that the confidence my generation experienced had

4 My favorite role models among Nobel laureates “against all odds” are Stefan W. Hell, Nobel Prize in Chemistry 2014, “for the development of super-resolved fluorescence microscopy” and Katalin Karikó, Nobel Prize in Physiology or Medicine 2023, “for ... discoveries concerning nucleoside base modifications that enabled the development of effective mRNA vaccines against COVID-19.” Katalin Karikó, *Breaking Through: My Life in Science* (New York: Crown, 2023) <https://www.nobelprize.org/categories/speeches/>

much to do with recognition. Despite our disagreements we discovered we had voice and agency. We exchanged recognition with each other, which made us eager and put trust in our perhaps too naïve belief that we can change the world.

Mine was a generation that had found its voice in the USA through opposition against the Vietnam War and in the student protest movement it unleashed which I experienced first-hand during my years at Columbia University, New York. The defense of my Ph.D. thesis could not take place at the premises of the university as the building was occupied by students. The Ph.D. committee moved to the living room in the nearby home of Paul F. Lazarsfeld, my supervisor. In Europe, the 1968 movement swept away the ultra-conservative hierarchies of the academic establishment. In Germany and Austria, it also brought with it a confrontation between the younger generation and their parents about the part they played in the countries' Nazi past. In France and Italy, it was partly the colonial past, partly other grievances that fueled the revolt against "the establishment" and hierarchies of any kind.

A good enough question implies to have a sense of direction and to select among the many existing possibilities. It has a focus but avoids premature closure. Having thus set the bar for myself, what do I expect to extract from my academic trajectory that is worth being shared and transmitted in the hope that my experience has something to offer to others? What is worth being extracted from the contingencies of my life and what can be learned from the privileges that I enjoy?

Contingencies in many forms and contexts form the "red threads" that are present in my work. Just like mutations in the biological realm, contingencies crop up also in the social world in different constellations, unexpectedly and everywhere. They find a crack in closed walls and go against the existing order. I have encountered them in such seemingly different arenas as policymaking as well as

in science, where they take the form of serendipity, a powerful and welcome ally of all practitioners of research. In public policy discourse, the perception is predominantly that of decision-makers, people in official functions who decide which policy measures to adopt when confronted with challenges and to solve pressing problems. In practice, the outcome is known, but relatively little about how and why certain decisions were reached. I have been engaged in science-policy advice on numerous occasions and sufficiently well-placed to observe the processes that ultimately led to a policy to be adopted or a decision to be taken. The outcome never was straightforward. Personal contacts and relationships of likes and dislikes, being at the right place at the right time, getting attention or being ignored, all play a role.

Historians follow the contingencies that play out on a grand scale. They encounter them, for instance, when reconstructing in minute detail the unfolding of the US-Cuba missile crisis which, for the first time, brought the world to a possible nuclear brink (Stern 2012). Some eerie resemblance to today's volatile geopolitical situation emerges when rereading Barbara Tuchman's *The Guns of August* or Christopher Clark's *The Sleepwalkers*, the classical historical accounts of the processes and contingencies leading to WWI. The major events and what preceded them, the personalities involved, the interests and resources of the different parties and the shifting distribution of power are vividly described in historical detail. We are led to ponder the contingencies that are an inherent feature of every complex system. When looking at an example of our present days, we seem dangerously close to reaching the tipping point which may trigger a phase transition leading to societal collapse (Turchin 2023).

In science, contingencies arise in the form of serendipity, which manifests itself in two closely related ways. First comes an encounter with a phenomenon or finding one does not expect, which happens

rather frequently. However, what follows makes all the difference: one must understand the significance of such a chance encounter. In our book on the discovery of high-temperature superconductivity and its aftermath, Ulrike Felt and I describe how only a few months before K. Alex Müller and J. Georg Bednorz made their breakthrough discovery (for which they received the Nobel Prize in 1987 in record time of one year later), a French research team using somewhat different material had made the same observation. Yet, they dismissed it as they did not recognize its significance.

According to Louis Pasteur: *le hasard ne favorise que les esprits préparés* (chance favors only the prepared minds), but can preparedness be planned and if so, how? For us, Müller and Bednorz's discovery highlights the interface between their individual drive which led them to conduct their research systematically, obtaining in the end what they were looking for, and the social organization of science. Which conditions are conducive for creativity and what can be done to prepare a scientific mind? An innovative breakthrough escapes predictability by definition. There is an inherent tension between the social organization of scientific research, which is set up as a stable framework for reasonable expectations and predictable, reproducible results, and the unexpected, unpredictable discovery (Nowotny and Felt 1997).

Contingency is closely related to the other theme that pervades much of my work—uncertainty—and what I call the cunning of uncertainty (Nowotny 2015). The more we acknowledge uncertainty, the less threatened we feel by it. I show how uncertainty is interwoven into human existence, but also how fundamental research thrives at the cusp of uncertainty. It is an integral part of the creative process, in the sciences and the arts. It is part of innovation as every decision taken may result in unintended consequences. The key question how to cope with uncertainty was catapulted on the public stage

during the COVID-19 pandemic. While many people were craving for certainty which made them retreat further in fear or aggressive behavior and politicians engaged in opportunistic simplifications and false promises, science exemplified how to face up to uncertainty. Scientists showed how to make the most of it by relentlessly pushing forward. Admittedly, communication with the public was difficult and much went awry. Yet, there is a lot to be learned from science and, as societies will be confronted with even greater uncertainty ahead, acquiring a better understanding of it and remaining open towards a future that evolves will be essential.

I have no theory of contingency to offer but am convinced that the threads and concepts that are interwoven in my work, and in writing reflexively about them, do hang together. Mine is a plea to keep the future open and acknowledge the uncertainty that is inherent in it and pervades our lives. I follow the dialectics between the wish to know the future and hence to strive for as much predictability as one can possibly achieve and the encounter with the unpredictable. There is the deeply rooted anxiety to be and remain in control which is always at risk to be undermined by the illusion of control as well as the opening of the human imagination through insatiable curiosity and the reaction by society that seeks to channel it and tame curiosity. The lens I use is that of science and technology studies, which enables me to follow in concrete and empirical ways how science and technology reveal the dynamics of these processes, generate, and drive them. However, the “solutions” science and technology have to offer must never be reduced to mere “technological fixes” or narrowed to a “techno-solutionism,” as this will only displace the underlying contradictions and conflicts, leading to new problems.

On a practical as well as on a theoretical level, I want to know how change happens in society. There is much official political rhetoric, and

even political will, about transformation towards greater sustainability, but very little is known about the mechanisms and how they work. We can describe many processes of change in retrospect but have to rely on abstract agent-based simulation models to get a glimpse of what might happen next. I hear politicians speak about “managing sustainable transition” and bold claims by academics about a “transition science.” When I see graphs with boxes carrying labels of abstract concepts and arrows standing for imagined feedbacks, it reminds me of the bygone age of modernity founded on the belief that everything can be planned, streamlined, measured, monitored, and controlled. Deep down, I am convinced that this is not the case, but I am challenged to come up with an alternative way of explaining change.

Much has been written about the hubris of modernity. Its achievements have been celebrated (Pinker 2018) and the horrific outcomes of the “intentions to do good” in the 20th century have painstakingly been described (Scott 1998). Today, we are confronted with the fallout of what had been excluded from the planning, as the degradation of the natural environment and its consequences pile up before our eyes. Even the idea of the future lost its previous attractiveness and fascination as the present fills with microplastics and other debris of consumption and an overload of information. The acceleration of technological change leaves us too little time to think and no free space to experiment with ways that lead to greater benefits for all. The future engulfs the present and it seems that we have lost our temporal bearings—a theme to which I will return.

These are some of the reasons why we should treasure contingencies and embrace uncertainty. Instead of clinging to obsolete dichotomies invented during modernity to ward off the fear of social, political, and cultural disorder, we should welcome ambivalence. We live at a time when we are faced with the messiness of the social world, unleashed

by scientific ingenuity, technological progress, political hubris, and human folly. We face a dilemma that is well known. We can try to get back on track, whatever it means and whatever it takes through reform, restructuring and reimagining the future. Or we can boldly strike out in new directions, carried by the conviction that the future is open and remains uncertain.

An intellectual memoir can only provide a brief, and moreover a highly subjective glimpse into my professional life, interspersed with a few anecdotes. It seems appropriate to add some scientific articles and excerpts from books I have published over the years. I hope that they offer the reader insights into the themes that have preoccupied me in my professional work and life, themes which I feel are still relevant today.