Brave new baby

It's no longer just sci-fi. New scientific developments are bringing closer a future in which parents can choose the height and weight of their offspring, and also influence such traits as openness, aggressiveness, attraction to danger, neuroticism and even political leanings

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On September 12, 1997, a few leading American newspapers carried an ad for a company called Gattaca, which offered aspiring parents "made to order" children. According to the ad, the firm offered the possibility of engineering one's offspring – determining a range of traits and characteristics relating to their gender, vision, intellectual ability, immunity to hereditary disease, degree of aggressiveness, susceptibility to addiction, and the like. Those who called the phone number that appeared for an appointment discovered that the company was fictional and that they had been taken in by a promotional campaign for a new science-fiction movie starring Ethan Hawke and Uma Thurman, titled "Gattaca" (based on the letters G, A, T and C, denoting the four chemicals that make up DNA).

Not everyone accepted the provocative ad with equanimity. "We urge Sony [the film's producer] to change their advertising to make it clear this is only a movie and that the scenarios portrayed in the ads are not real," the executive director of the American Society for Reproductive Medicine declared.

Indeed, two decades ago, scientists could not really offer future parents the option of deciding their children's genetic attributes. The movie itself was made against the backdrop of technological developments aimed at deciphering the human genome, a project that was completed just a few years after the film's release. But even after scientists succeeded in reading all the letters of the "code of life," predictions that it would be possible within a few years to determine the hereditary basis of every human trait failed to materialize. Still, in 2011, NASA scientists chose "Gattaca" – which depicts a future dystopian society that uses genetic profiling and engineering to decide people's fates – as the most realistic science-fiction movie of all time. Apparently they were not wrong: What seemed like science fiction 20 years ago is now taking concrete shape before our eyes, at least in terms of scientific capabilities, if not yet in practice.

Several scientific-technological breakthroughs of recent years constitute new challenges to the meaning of "human equality," and even raise questions about the way we define the limits of humanness. Today's accelerated progress toward a future in which parents can choose the sort of child they want began with something called preimplantation genetic diagnosis. PGD is being offered today to people who carry a genetic disease as the initial step in-vitro fertilization. In the laboratory, the fertilized egg is allowed to divide for between three and five days. A single cell – or a small number of cells – is then removed from the tiny embryo (a process that will not harm the newborn) and its DNA is examined by means of sophisticated (and constantly evolving) technological means.

First developed in the 1990s, this method was initially used to detect embryos suffering from serious genetic syndromes. It can also be used to select for the embryo's sex in cases in which both parents are carrying mutations that cause diseases that affect only boys. (Israel is one of the few countries where the gender of the embryo slated for emplanting can be chosen for nonmedical reasons as well, subject to authorization by a Health Ministry committee.)

However, today's future parents have many more options. The vast progress that has been made in recent years in genome sequencing makes it possible to receive, at a low cost, a comprehensive genetic scan of the embryo or even a complete sequencing of the genome. With its help, it is possible to identify the presence of mutations that have been linked to the development of certain diseases, such as cystic fibrosis and thalassemia (a chronic genetic disease that causes severe anemia).

At the same time, as has become increasingly apparent since completion of the Human Genome Project in 2003, only a very small number of diseases are linked to the activity of a single gene. Most genetic disorders, and most human traits in general, are caused by the interaction of a large number of genes. In order to identify the way multiple genes interact with one another, scientists are making comparisons – by means of what are called genome-wide association studies – between an increasingly large number of individuals in their search for common denominators in the genomes of people who share certain traits.

Thanks to the plunging costs of genetic sequencing and the growing number of databases incorporating the genetic data of hundreds of thousands of people, along with their biographical and medical information – new studies are being published every week revealing multiple regions in the genome that can be linked statistically to different traits. The contribution of any one of these individual regions to the disease or trait under study is generally minuscule. But the statistical tools now available enable scientists to combine the effects of a broad range of such regions, resulting in what is called a "polygenic score," which makes it possible to forecast the appearance of a particular trait.

Thus, thanks to the genome-wide association studies, scientists can estimate the risk of people being affected by a host of diseases, including diabetes, various types of cancer, and heart and vascular ailments. But researchers' curiosity does not stop with physical diseases. These powerful tools of genetic analysis are also being applied to mental disorders, and with growing success. For example, a new study published in November presented whole-genome comparisons of more than 700,000 individuals, of whom 200,000 had been diagnosed as suffering from various psychiatric disorders. The researchers, from the Psychiatric Genomics Consortium, identified over 100 genetic variants (alterations in the DNA sequence in a genome that are different from that of the majority of the population) that affect the risk of having a mental illness.

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Another study, whose results were presented recently at a conference of the American Society of Human Genetics, showed success in identifying the so-called "holy grail" of the genetic study of mental disorders: the genes that affect the risk of schizophrenia. An international consortium of scientists found that people carrying two copies of certain rare mutations on 10 specific genes will be at four to 50 times higher risk of developing schizophrenia.

What about physical traits not related to disease? Researchers have been intrigued since the 19th century by the connection between heredity and height. More than 100 years ago, scientists were able to assert that tall parents were more likely to have tall offspring. However, it's only in recent years, thanks to genome-wide association studies, that researchers have begun to focus on specific regions of the genome in which variations can explain the hereditary component that determines a person's adult height. (This hereditary component determines 80 percent of the height differences between people; the other 20 percent depends on the environment in which the person grew up.) Similar studies have sought to determine the polygenic score that explains other physical variations, such as body weight, the relation between the width of the hip and of the waist, age of first menstruation, age of menopause and more.

Also outside the realm of disorders, the healthy human psyche has been the subject of mounting interest. Scientists have recently compared the genomes of tens of thousands of subjects in order to identify genetic components related to characteristics such as openness, aggressiveness, attraction to danger, neuroticism and even political inclination. This field of study, known as "sociogenomics," also encompasses studies aimed at revealing the genetic component of various types of human behavior such as alcohol and caffeine consumption, cigarette smoking and use of cannabis.

In this context, a study published in November in the journal Nature Communications found that a correlation exists between genetic variants associated with alcohol intake in couples. The researchers reported that they have explained, at least partly, the biological component involved in a phenomenon, well known from previous studies, in which both members of a couple have similar drinking habits.

Focus on IQ

Sociogenomic research type draws considerable media attention, but the main reason for public and scientific interest in the field derives from efforts to decipher the genetic basis of intelligence. Scientific journals frequently publish studies, based on increasingly larger samples, whose goal is to identify genetic markers related to intelligence quotients.

To date such studies have been able to explain five percent of the variation in IQ levels, according to Dr. Shai Carmi, a researcher of statistical and population genetics at the School of Public Health of Hebrew University's Faculty of Medicine. "Five percent doesn't sound like much, but it's a lot more than we were able to explain until just a few years ago," he notes.

A genome-wide association study relating to intelligence that was published last year in the journal Nature Genetics and which included a comparison of genomes of over a million subjects achieved even greater success: The researchers maintained that the genetic markers they identified can explain between 11 percent and 13 percent of the differences in levels of education attainment among people.

These developments prompted Abdel Abdellaoui from Vrije University in Amsterdam to investigate whether developments in the field of sociogenomics and the existence today of huge genome databases would make it possible to compare variations in certain genetic features among residents of different geographical regions. Dr. Abdellaoui's study, reported in October in the journal Nature Human Behaviour, was based on over 450,000 subjects. He and his colleagues drew on the British public database UK Biobank to examine the frequency of variants linked in previous studies to more than 30 different behavioral and personality-related traits. With regard to many parameters, such as genes linked to a fondness for caffeine, no differences were found between different regions. However, it turned out that with 20 traits, genetic differences could be detected between residents of different areas in Britain. The clearest difference emerged regarding predisposition to so-called educational attainment (the highest academic degree an individual has completed). In fact, Abdellaoui tells Haaretz, "the more genetic effects these traits shared with educational attainment, the larger the regional differences were for that trait."

Where did the research team discover the most people with genetic attributes linked to low levels of education? In Britain's poorest regions.

Abdellaoui: "We also observed that migration is increasing these regional differences. People who are leaving the poorer regions of the country have a higher genetic predisposition for educational attainment than the rest of the country, while the ones left behind have the lowest on average." The study, he adds, revealed a mechanism by which, over generations, social inequality becomes more entrenched at the biological level as well.

One of the main problems of genome-wide association studies, and in particular with research relating to sociogenomics, is that, although they may reveal a statistical correlation between social traits and genetic markers, they do not tell us anything concrete about the causal relationship between them. The reliance on databases in such research, and also the media's propensity to take the results of the studies to extreme conclusions, are creating the impression that we will soon be able to discover the genetic components behind the differences in people's behavior. However, some scientists are saying that these studies are creating a false impression.

This problem was highlighted in a conceptual experiment undertaken last year by Graham Coop from the University of California, Davis. Imagine a fictitious scientist named Bob who wants to find the genetic basis for the fact that British people drink more tea than the French, Dr. Coop postulated. To that end, Bob uses UK Biobank to estimate the average number of genetic variants associated with tea drinking. According to Coop, if Bob succeeds in showing that the British possess on average more variants of this kind, he would be able to claim that the British predilection for tea has a genetic component. The problem with this mode of thought, writes Coop, is that genome-wide association research identifies variants affecting the fondness for tea, but only those that have a correlation with that trait in the specific environment in which the subjects whose information appears in UK Biobank live. In other words, there is no way to know from Bob's study whether people who grew up with the same genetic components in a different environment would also like tea.

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Now let us go back to more concrete research relating to the connection between education and geography in Britain. To neutralize the question of the influence of environment on educational attainment, Abdellaoui explains, he and his colleagues used a polygenic score measuring that attribute within a non-British population. That score, they showed, predicted with great accuracy the predisposition of the British for educational attainment.

"This is pretty strong evidence that the effects we find cannot be entirely attributable to environmental confounders," Abdellaoui notes. (Confounders are factors that simultaneously influence two variables, leading to apparent correlation between them even in the absence of any causal relationship.) What is more difficult to determine, he adds, is the extent to which the genetic effect is significant. Accordingly, the next stage in their research focuses on families, where a comparison is drawn between siblings who grew up in identical environments to determine whether their polygenic score is consistent with their academic achievements – or their place of residence.

For his part, Carmi, of the Hebrew University, relates that he, too, has embarked on similar research but so far, based on preliminary findings, says he is not convinced that there is a significant connection between the genetics of educational attainment and one's residence.

Inventing correlation

Sir Francis Galton (1822-1911) is considered one of the most influential researchers of his era, for good and for ill. The British scientist, Charles Darwin's cousin, came from a family that prospered from arms sales and the slave trade. Despite their great wealth, the Galton family did not consider themselves to belong to the British elite, one reason being that none had attended university. It was with this baggage that the 18-year-old Galton entered Cambridge University where, after repeated failures on exams and a nervous breakdown, he made do with a basic undergraduate degree. This failure left a mark on the young man's psyche and bolstered his perception that intelligence is a hereditary trait, just like one's physical attributes.

To prove this, Galton embarked on a study of the academic achievements of his Cambridge colleagues and their families. In seeking to decipher possible interconnections between heredity, intelligence and educational level – he also created a new statistical concept: correlation. His deep conviction that "genius" is an innate trait led him to develop the idea of improving the human race. "What a galaxy of genius might we not create," he observed in a text published in his 1865 work, "Inquiries into Human Faculty and its Development." In 1883 he coined the term "eugenics" (a fusion of two words from ancient Greek: "eu," meaning good or well, and "genes," meaning birth; hence, "well born"), and went on to urge governments to breed citizens the way they did cattle or corn.

Eugenics is known today primarily because of the way it was applied within the context of Nazi ideology, and as a result eventually disappeared from scientific discourse. But in the decades between Galton's invention of the term and the end of World War II, eugenics held sway in such discourse. In the early 20th century, it also influenced the policy of various countries. For example, in various places in the United States eugenics-inspired laws were passed that called for sterilization of individuals classified as "feebleminded"; there was also federal legislation that curbed immigration from countries perceived as having eugenically "inferior" populations.

Despite the crimes committed in the name of eugenics, scientific interest in the two pillars of Galton's genetic research – distribution of variations in intelligence and height – never abated. Indeed, says Carmi, these traits have been the focus of the broadest genome-wide association studies. For this reason, when the Hebrew University scholar and his colleagues decided to examine the potential of using polygenic scores to select the most "high-quality" embryos, in a "Gattaca"-style experiment – the attributes studied were the same as those Galton looked at 150 years ago: intelligence and height. The article presenting the findings was published in November in the journal Cell.

To determine the value of prospective parents undergoing IVF to choose embryos according to currently existing polygenic scores, Carmi and his colleagues created thousands of virtual embryos by imagining the random combination of the DNA of subjects whose genome had been sequenced in earlier studies. Each of these embryo simulations was then assigned a polygenic score, based on previous studies, for height and IQ, and a comparison was drawn between the embryo with the highest score and the average embryo for each "family." The result: when choosing an embryo from among five embryos, on average 2.5 points can be added to the IQ and 2.5 centimeters

From left: Researchers Abdellaoui, Bentwich, Carmi. "In the foreseeable future," says the latter, "we may be able to achieve an improvement averaging almost five centimeters [in height] and seven IQ points." *Jitske Schols, Bimal Nepal, Emil Salman*

(about one inch) to the height. When having to choose between 10 embryos, the potential gain is three IQ points and three centimeters.

In the second stage, the scientists compared their findings with the "virtual embryos" with those of real people. To that end, they drew on an earlier study done at UCLA by Israeli-born geneticist Danny Zeevi, which included dense genetic data and height measurement for the members of 28 ultra-Orthodox families, with up to 20 children per family. In this stage, the research team treated each child like an embryo and examined the genetics relating to their height. They then checked to see whether the child with the highest polygenic score for height was indeed the tallest sibling. The result: As with the virtual embryos, on average, across families, the child with the highest score was indeed taller than the family average, but there were differences between families. In practice, in most of the families there was a taller sibling, and in a quarter of the families the sibling who received the highest score was actually shorter than the family average.

The research among the Haredi families did not include IQ data, but according to Carmi, whereas the polygenic score is capable of explaining 25 percent of height differences, the situation regarding prediction of IQ is far less accurate – with an explanation of only five percent of the differences. Thus, it follows that there is far greater uncertainly with respect to IQ. Generally speaking, the disparity between the average result and the result in practice points up the extent to which even a trait such as height – whose genetic component has been studied for more than a century and has been examined in genome-wide association studies involving almost a million subjects – is influenced by factors that are not understood by scientists.

Despite this, Carmi agrees that, with more studies being based on broader genetic databases, predictive ability will be enhanced, with the benefits of embryo selection increasing accordingly. "In the foreseeable future, we may be able to achieve an improvement averaging almost five centimeters [in height] and seven IQ points."

Another barrier that technological developments may overcome in the coming years concerns the number of embryos from which a choice can be made. At present, IVF entails harvesting eggs from the mother, an invasive and very unpleasant procedure in which a limited number of eggs can be obtained. Researchers are presently developing the means to create reproductive cells from stem cells (which can already be produced from every cell in the body). If this technology, currently in the research stage, is shown to have clinical applications, the possibility of having an unlimited number of embryos to choose from should make the choice of the most "select" embryo even more beneficial.

Still, there are many other obstacles on the road to a future where one can select an embryo's traits "Gattaca"-style. To begin with, as Carmi notes, the embryo with the highest polygenic score for IQ will not necessarily have the highest score for other attributes, and if one hopes to improve those additional traits, the maximum gain achievable for each one will likely decline. Second, as Abdellaoui points out, as long as we do not understand the mechanism by which every genetic component exerts its influence, and how mechanisms of different characteristics are interrelated, there is a risk of causing more harm than good.

"Many traits share genetic influences with each other, and we don't fully understand these relationships yet," he says. "Educational attainment, for example, shares genetic markers with bipolar disorder and autism. So if you select the embryo with the highest genetic predisposition for educational attainment, that embryo is also likely to have a higher risk for bipolar disorder or autism." In any event, Abdellaoui is convinced that "it's premature to use DNA to predict complex behavioral traits on an individual level. Any company that sells these tests as reliable is not being honest with their customers."

According to Shai Carmi, the potential benefit of selecting embryos for IQ adding an average of 2-3 points is currently relatively minor. But in contrast, he noted, using the above-mentioned technology to reduce the risk of diseases, physical and mental, in embryos could be more useful. The reason: As with genetically sequenced attributes, such as IQ and height, a disease, too, derives from a combination of hereditary attributes and environmental conditions. But in contrast to sequenced traits, a disease is a binary phenomenon: Either you have it or you don't. Therefore, in the case of a disease, even a slight diminishment of a genetic risk for its occurrence could be beneficial. Instead of the disease breaking out in regular environmental conditions, lowering the risk by a few percentage points could cause it to erupt only in exceptional environmental conditions.

Still, there are already companies offering embryonic tests relating to intellectual ability. Genomic Prediction, an American firm co-founded by Stephen Hsu, a statistical geneticist focusing on risk prediction, and Nathan Treff, one of the world's leaders in the realm of genetic diagnosis of embryos used in vitro fertilization, offers its clients screening options based on a variety of criteria.

The company is very careful to avoid violating accepted ethical standards. It emphasizes that the tests identify only embryos that are at high risk of various diseases, nor does it engage in embryo screening according to any sort of aesthetic or intellectual criteria. But, along with tests of the risk level for developing polygenic diseases such as diabetes or heart ailments, the company also does offer a test that identifies embryos at risk of suffering from "intellectual disabilities" (it does not elaborate) or of being of short stature without a clear medical explanation.

Genetics or racism?

Not everyone believes that such a sharp distinction can be made between the use of genetic technology to help avert disease in embryos and screening them for the purpose of selecting enhanced attributes. According to Miriam Bentwich, a senior lecturer in bioethics from the Faculty of Medicine at Bar-Ilan University, many thorny issues arise even before any such measures are taken.

"On what basis do we decide what the human norm is?" she asks. "How do we define a disease as distinct from a flaw? Is deafness, for example, a disease, and should we therefore prevent the birth of deaf people?

These questions are only part of the discourse surrounding what's called the "new eugenics," taking place against the backdrop of continuing advances in testing for genetic "flaws" and syndromes – and the potential for gene editing.

Bentwich: "Today there are bioethicists, jurists, geneticists and even physicians who can argue that, even with the advanced genetic testing of our time, we are very far from the eugenics of Francis Galton, who intermixed heredity and environment, and are certain that we are far from the racist additions on the part of his successors in eugenics."

Moreover, on the face of it, there is a further essential difference between the old and the new eugenics. In the past, decisions in this realm were made by the authorities, whereas today, in the wake of recent technology, it is typically up to parents to decide what is best for their future children.

"But how much of a choice do the parents actually have?" asks Bentwich who, together with Prof. Tamar Gidron, from the law school of Safed Academic College. organized a symposium last month on "New Eugenics and Gene Editing," at Bar-Ilan's medical school, in Safed.

"For example," she continues, "a very serious stigma is still associated with mental diseases. In that atmosphere, how much freedom of choice does a person have to say that he is ready to accept the risk that his child will suffer from such a disease, and that the disease is actually only one aspect of the whole person?"

Another factor affecting parents' decisions in this realm is financial. To what extent can they allow themselves to raise a child with a genetically-based syndrome, especially if it may lead to complications or a chronic condition that require huge outlays not usually subsidized by the state?

A further problem, Bentwich notes, involves the issue of informed consent: "Does everyone who deals with the results of the tests truly understand that in most cases they are only statistical in nature and that most of the syndromes are as much dependent on environment as on heredity, and that even within one specific genetic syndrome a range exists for the disease's clinical manifestations?"

Finally, she says, it is difficult for many people to ignore the echoes of the narrative of the old eugenics, even in the context of contemporary technology identified with the new eugenics – that is, the concept of creating a society without "abnormal" individuals by excluding them from that society, through selective reproduction. That exclusion gives rise to various moral questions. For example, what will the effect be on the rights of people who are living with a disability in a society where embryos with "flaws" like theirs can now be identified and filtered out? What effect will such screening have on the society itself?

In the original ending of "Gattaca," Bentwich recalls, the names and photographs of key women and men in the history of the 19th and 20th centuries appeared, along with information concerning the genetic syndrome from which they suffered. If their parents had known about their syndrome and could have so desired – they might have decided not to have them. The list includes Albert Einstein, Vincent van Gogh, Stephen Hawking, Abraham Lincoln and Ray Charles. Ultimately, the producers decided to drop this ending, after participants in a test screening reacted negatively to the original last sentence: "Of course, the other birth that may never have taken place is your own."

Bentwich stresses that none of this means that research on the genetic underpinnings of certain traits and of disease should be halted; certainly, she believes people should not be deprived of the right to make decisions about their bodies, and women should be allowed to decide whether to have an abortion. However, she notes, the moral issues she mentions must be part of an ongoing discussion regarding continued development of technology in the realm of genetics. Indeed, the entire public needs to be involved in it – not only the professionals such as scientists, bioethicists and legal experts. "It is very problematic to advance the technology and have impressive achievements with respect to preventing diseases and then to leave all the responsibility in the hands of the parents," she notes. "Perhaps there is a need for the state to decide, with public agreement, where the red lines are."

Indeed, Israel's government has had a part in decisions relating to the intersection between genetics and reproduction, and to certain advanced technologies. For example, in regard to human cloning, the Genetic Intervention Prohibition law, originally enacted in 1999, and amended in 2006, stipulates that cloning is forbidden, albeit for a limited period: A reassessment can be undertaken every few years in light of scientific and technological developments and their social and ethical ramifications.

Will a public debate of this kind and enforcement of the red lines suffice to prevent the realization of dystopian visions as in "Gattaca"? Not necessarily. For example, the latest sociogenomics research, which was widely reported, found genetic markers linked to sexual preferences. The reservations the authors of the study expressed about drawing conclusions for an individual did not prevent an American entrepreneur based in Uganda (where same-sex relationships are not legal) from suggesting that people should upload their genetic information to his application and, for just $5.50, get a "genetic answer" to the question of "How gay are you?"

Another example is a study published last year in which researchers showed how genetic technology can create a placebo effect of a new type. When subjects were told they had a genetic variant that would affect their fitness, they were faster to give up running on the treadmill, and as a result "objective" physical indices, such as the rate of which carbon dioxide is removed from their body, also declined. On the other hand, subjects told that they had a variant that had a positive effect on their sense of satiety, reported feeling less hungry at the end of a meal, and higher levels of a hormone indicating a feeling of being full were detected in their blood (whether or not they actually possessed the variant), as compared with the control group.

> 'It is very problematic to advance the technology and have impressive achievements with respect to preventing diseases and then to leave all the responsibility in the hands of the parents,' says Miriam Bentwich.

Israel, the United States and most European countries already have laws on the books to prevent disclosure of an individual's genetic information. Such legislation is intended to prevent insurance companies, employers and others from discriminating against people based on their genetic profiles. When the information that can be gleaned about a person from his or her DNA becomes more extensive, the importance of privacy legislation of this kind will grow – as will the temptation to find ways to sidestep potential legal constraints.

The most blatant example of the limited ability of scientists and the law to prevent ethically dubious experiments apparently occurred a little more than a year ago. If you had asked the world's leading geneticists in autumn 2018 whether the popular gene-editing technology CRISPR Cas-9 was ready for use in editing human embryos and alter their reproductive cells (so the change would be passed on to the following generations) – they would have rejected this out of hand, convinced that no one would dare do it.

That consensus did not prevent He Jiankui, a young Chinese scientist from the city of Shenzhen, from announcing, in November 2018, that he had brought about the birth of twins whose genome was edited with the technology in question. Moreover, it can be argued that the gene editing was performed not to prevent a serious genetic syndrome, but to create "upgraded" human beings: two infants, to whom the researcher tried (with only partial success at best) to grant natural immunity from AIDS by means of a genetic modification that ostensibly reduces the risk of infection with the disease. Chinese authorities dissociated themselves from his research altogether and a few days ago, he was sentenced to a three-year jail term for engaging in "illegal medical practices."

This case, too, can be seen, with cautious optimism, as reinforcing the commitment of the scientific community and the general public to ethical rules when it comes to applying new technologies, considering the awakening of public interest in the implications of gene editing after the case was reported, and the sharp official reaction by the Beijing authorities. Be that as it may, the barrier to the post-human era has already been breached, and the future holds a host of exciting opportunities – but also some harrowing dangers.

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of it will not be unsealed, even in the face of specific requests. Only recently, the bureaucracy fought to leave sealed documents from the "Saison" (the so-called "Hunting Season" of 75 years ago, before the state's establishment, referring to the effort by the official Haganah militia to suppress anti-British activity by the Irgun); from the War of Independence; and from the Kafr Qasem massacre of 63 years ago (when Israeli troops shot residents of the village of Kafr Qasem, who were unaware that a curfew was in force at the start of the Sinai War).

Some material is rightly classified. Documents relating to intelligence gathering, for example, or methods of surveillance of top terrorists, whose revelation would help the other side take evasive action. However, this limited and specific concealment has long since become a case of general concealment – broad, deep and permanent. The possibility of Israel presenting to the court in The Hague security documents from recent years, even as it refuses to show its citizens documents from its early days, seems remote.

The aftermath of Israel's 2002 Israeli attack that killed Hamas leader Salah Shehadeh, in 2002. The incident led to serious deliberations within the security establishment. *Vadim Ghirda/AP*

The concealers are generally bureaucrats who have undergone a relatively uniform professional socialization. All have high security clearance and came through the ranks in an organizational culture of maintaining secrecy. They are convinced that what is known to them must not become known to the public, for if it does, state security will be infringed. Most of them are not operational fighters who risk their lives in combat, but their environment has persuaded them that by hiding what they know, they too are defending the state. Few of them follow the international dialogue on such matters, which in any case is not conducted in Hebrew. Without admitting it, they have created a professional and sociological bubble of keepers of secrets, operating in the face of an amorphous public that they see as unreliable.

Since the failures of the Yom Kippur War, it's conventional knowledge that there are specially designated intelligence officers whose task is to dispute and challenge all the other colleagues surrounding them, in order to avoid the arrogance of a consensual conception. But in the circles that protect archival material – security professionals, legal experts, archivists – no one has the role of casting doubt. Even most diplomats, who are exposed to the external world by the nature of their profession, are more in the nature of bureaucratic workers than they are citizens of the world.

Within a short time, the cabinet may have to decide about Israel's comportment before the court in The Hague. They will be surrounded by people from the bureaucracy, whose take on unsealing documents is quite uniform. Ministers, too, are only people, and if the bureaucrats around them are in full agreement, only independent, self-confident ministers will want to assume the responsibility of independent decisions. The others will flow with the recommendations of the professional echelon, without questioning whether those recommendations are correct.

Dr. Yaacov Lozowick was Israel's state archivist from 2011 to 2018.