

Technology and Jewish Life^{1,2}

Manfred Gerstenfeld and Avraham Wyler

Technology continues to have a strong and specific impact on Jewish life. It has caused major social changes in various areas, such as the suburbanization of Jews, women's increased learning, and the possibility of participating in worldwide community activities. From a socio-halakhic viewpoint, technology influences Jews' choice of residence, has socialized and politicized kashrut certification, and has changed modes of Jewish study. The development of new technologies has brought with it many halakhic challenges and decisions, on Shabbat observance among other things. Technology may also stimulate better observance of the commandments. It influences Jewish thinking and is leading to new ways of presenting ancient concepts. From a philosophical viewpoint, Judaism proposes a way of life that is not subordinated to technology, unlike life in general society. This is mainly expressed in the domain of holiness. Developing a more detailed analysis of the interaction between technology and Jewish life will open new horizons for learning, studying, thinking, research, determining halakha, and making practical decisions.

Introduction

The concept that technology is double-faced, that is, its use can make human life better or facilitate greater evil, can already be found in the midrashic literature on the first chapters of Genesis. The number of interactions between Jewish life and technology is far too large to be systematically enumerated. One can only outline how diverse this interaction is, and show that it goes much further than its most-discussed element: the impact of new technology on observance of the Torah and mitzvot (commandments).

The destructive use of technology is already expressed when it is said in the Torah that Tuval-Cain forged "all implements of copper and iron."³ Basing his argument on a midrash, Rashi interprets this text as saying that Tuval-Cain improved on Cain's skills by making weapons for professional murderers. Cain had only been an amateur who had invented his weapon on the spur of the moment.⁴

The Torah recounts that, when Noah was born, his father Lamech said: "This one will provide us relief from our work and from the toil of our hands, out of the very soil which the Lord placed under a curse."⁵ A midrash explains the constructive use of technology: until Noah was born, mankind had worked the earth with bare hands. After his birth, he prepared plows, scythes, axes, and other tools for them, which greatly alleviated man's plight.⁶ The two midrashim, which precede the philosophers' conclusions by many centuries, are small indicators of an important yet largely unexplored discourse: the interaction between technology and Jewish life.

The neutrality of technology in Western society was originally a liberal concept. Several modern philosophers have reached the conclusion, however, that technology cannot be neutral. Mario Bunge calls Joseph Agassi's book on technology: "An eloquent plea for the democratic control of technology, a cultural force that, though ambivalent, is never socially neutral."⁷ Agassi writes: "technology must cross the interface between the physical and the social: pure cases do not exist."⁸ Today, there is a broad consensus that neither the search for technology nor its profound impact on society are neutral.

The Main Characteristic of Our Time

The expression "the age of technology" stresses that technology is generally considered the main characteristic of our time. For more than a century already, it has permeated the most important facets of life and become a total - and sometimes even a totalitarian - phenomenon. A simple example is that many people can no longer function normally during an electricity blackout.

Science and technology are expected not only to exert even stronger social influence in coming decades, but also to accelerate further in many fields such as information, communications, genetics, and biotechnology. The increasingly virtual character of many activities is another important aspect of this development. Electronic media, by selecting among elements of reality, create a virtual reality. Money, one of the key elements of modern society, has largely become virtual: its transfer mainly consists of computer manipulation, without anything tangible changing hands.⁹

By investigating technology in its totality, one can obtain insights beyond those gained from assessing its impact on individual disciplines. Presumably, a systematic, general analysis of Jewish life from the perspective of technological development will also lead to a deeper understanding. This is true, for example, in fields such as sociology, community organization, and Jewish law and thought. The following preliminary strategic overview indicates part of this potential.

Technology has often affected Jewish communities and individuals differently from general society, in both the social and religious spheres. The magnitude of its religious impact is related to degrees of observance of commandments such as Shabbat and kashrut (dietary laws).

The increased importance of technology also requires a general assessment of the opportunities and threats it poses to Jews and their way of life. Clarifying both the present and potential future impact of technology will enable Jewish religious and communal leaders to better integrate it wherever it is beneficial, and to repel it wherever it is not.

Additional Directions

One can analyze the interaction between technology and Jewish life from many more angles. One may ask, for instance, whether Judaism has a specific, coherent attitude toward technology that may be of relevance to the external world. It will be seen below that this is indeed the case.

There are several other possible directions for further investigations. For instance, Jews have played an important role in the development of science and technology, as indicated by the many Jewish winners of the Nobel Prize. Some attribute this to the fact that Jews are a well-educated minority and, as such, have a special intellectual perspective.

Many use this in a broader sense to explain, for instance, Jews' numerous contributions to American culture.¹⁰ It is unclear, however, whether Judaism has an inherent potential for specific impact on the development of science and technology that goes beyond what Einstein and other researchers have achieved as individuals. In the Talmud, one finds descriptions of many scientific factors and experiments.¹¹ Halakhic thinking may also influence Jews' inclination to natural science: both require disciplined thinking within a defined framework.

There are many more subjects to be considered in the framework of the interaction between Judaism and technology. Another direction that should be analyzed is the direct and indirect economic aspects of the interaction between Jewish life and technology. The further this journey of discovery continues in coming decades, the more areas in this vast field will open up. To put some order into this broad and fragmented subject, it is attempted here to make a first mapping of its main categories, and to provide initial findings on a few issues.

Sociological Aspects

Technology has strongly influenced the social organization of Jewish life. In the mid-1970s, Daniel Elazar briefly analyzed how technology was causing some of the important social changes that Western Jewry was undergoing. He stressed that this influence was often neglected in the discussion of contemporary Jewish life.

Elazar noted that: "the invention of the jet plane and the telephone have had as much influence on the patterns of American Jewish life as any more widely hailed social factors.... The automobile more than any other single factor ended the neighborhood life of American Jewry, by making sub-urbanization possible."¹² He added:

The ability of Jews, wherever they live, to participate in the activities of the world Jewish community, to get to Israel rapidly and to send their children there for brief stays, to jet around the United States itself to attend meetings in New York, Miami, or Kansas City - all this has had a tremendous impact on who participates in the life of the community and under what conditions.¹³

Such changes are also taking place in Gentile society, but not necessarily in the same ways and with the same outcomes. Frequent Jewish congresses are among the many new types of activities that technology has made possible. Another aspect is that community leaders abroad make special solidarity visits to Israel in times of crisis, as occurred during the Gulf War and the Palestinian uprising. Modern communications thus have a global impact on Jewish life, due to their integrative character.

The Multicentered Approach

Years later, Elazar enlarged on his findings and referred to another aspect of the communication between Israel and the Diaspora: the extreme case of the small number of people who live in Israel and work abroad. He added that Diaspora Jews can now take a multicentered approach to life, for example, by living abroad and visiting Israel several times a year.¹⁴

Another example of this is the celebration of weddings and bar mitzvahs in Israel, often at the Western Wall, in which family members from all over the world are now able to participate. The same goes for those Jews coming to console mourners.

The Hasidic courts are one sector of Jewish society for which such a multicentered approach has become typical. As the sociologist Menachem Friedman writes:

In the past, emigration overseas led to an almost total cut-off between the hasid and his rabbi. Modern electronic means of communications make it possible for hasidim, dispersed in big cities in the West, to be in continuous touch with their center, to ask advice and be answered immediately.... The development of air traffic has enabled hasidim to come for the holidays and to feel that they belong.¹⁵

The worldwide development of the Chabad movement is another phenomenon in the Hasidic world that has only been possible thanks to the modern communication systems.

Holocaust Assets, Israel, Jewish Women

One central political issue within the Diaspora community at the end of the twentieth century was the effort to obtain restitution for the assets looted from Jews during the Holocaust, and the resulting international pressure on European bodies. This confrontation with European governments and institutions took place in the framework of a network of internationally organized Jewry. It would have been much more difficult without the technological developments that enable rapid written communication, such as faxes and the Internet. Modern communications technology fostered an intercommunal, transatlantic Jewish polity for this type of purpose. The survival of the state of Israel - the most meaningful Jewish community of our time - in the face of its enemies is also based on greater technological understanding among broad layers of the population.

The status of women is another aspect of the social change that technology has wrought in Jewish life. Domestic appliances have played an important role in enabling the Jewish woman to be active outside the home. Technology has indirectly created opportunities for employment and study.

More than a hundred years ago, the process of washing laundry, alone, would have taken many hours at a time, and occupied women intensively. Since the invention of the washing machine, the housewife's manual involvement is now limited to putting the laundry into the machine and taking it out again. The free time thus created has changed the social status of Jewish women. Although this is true for women in general, there are also elements here of specifically Jewish import, such as Jewish women's increasing interest in Jewish learning.¹⁶

The areas in which technology has affected Jewish behavior are too numerous to identify. Another field is fundraising, as Jewish causes now often collect money through telephone campaigns. Technology has also affected outside behavior toward Jews, some aspects of this being very negative. Anti-Semitic attacks have found a new outlet in the Internet, a factor that also makes it easier for anti-Semites around the world to group together.¹⁷

Virtual and Physical Presence

One can speculate about the future social impact of technology on Jewish communities. In a society in which more people will work from their homes, some will move to remoter areas, while still wishing to belong to a community. One can imagine various means of participation in activities, without being physically present, for instance by videophone.¹⁸ Developments may force communities to increasingly offer such virtual participation.

Meetings of mixed Israel-Diaspora bodies now sometimes include a telephone linkup with members abroad. This changes the way in which - and sometimes the frequency with which - issues are discussed, and may give Jews abroad more influence than they have wielded in the past in bodies that usually meet in Israel.

In our fragmented society, however, an opposite development may occur simultaneously: in the future, as more people begin to work from home in relative physical isolation, social communication through Jewish religious services and community activities may come to appeal more to some than they do at present. The more isolated daily life becomes, the more need there may be for social alternatives. This may turn out to be an opportunity for increasing outreach.

Religious Attitudes

In Israel, readings of the Megillat Esher and *selihot* prayers are broadcast on television. Another side of the interaction between technology and prayer is the disruption increasingly caused in synagogue services when mobile phones ring or watch alarms sound.

A social issue of a different nature was raised in Israel at the beginning of 2000, when the *beth din tsedek* (high court) of the ultra-Orthodox community issued a statement against the use of the Internet, connection to television through the computer, and games on compact discs. It was claimed in advertisements that these present "a terrible danger to the holiness of the Land of Israel and the continuation of the generations." The main reason, however, is the wish of the community leaders to limit their followers' exposure to the secular world.

This announcement was made in light of the dilemma facing the rabbis: a substantial number of the ultra-Orthodox have computers, needing them for work or studies. One source from within the Israeli ultra-Orthodox community estimated the number of computers in ultra-Orthodox residences between twenty thousand and thirty-five thousand at the turn of the century.¹⁹ Forbidding personal computers altogether would thus be impossible for the community to live with, unlike the case of television.²⁰

New Opportunities

Combining modern technology with new techniques and methods also influences Jewish behavior. Many disciplines are creating new opportunities for fostering Judaism. Increased marketing awareness has enabled the Chabad movement to develop its Mitzvah Mobile. This enables more people to fulfill commandments, such as laying *tefillin* (phylacteries) or saying the blessing over the *arba minim* (the four species of plants on the Sukkot holiday).

Chabad is an Orthodox institution with a particularly sharp eye for what modern methods can do for Judaism. It uses several aspects of modernity such as psychology, communications, and various marketing and advertising techniques.

The same is true for outreach yeshivot (higher Talmud schools) such as Or Sameach and Esh haTorah that cater to the newly Orthodox. Among other things, the latter organizes high-powered activities to promote Judaism. One of these was the sponsoring of a high-tech conference in Israel. Yeshivot focusing on ultra-Orthodox students, such as Mir or Ponivesh, do not use such "marketing" tools, as they are hardly interested in reaching out to non-Orthodox Jews.

Socio-Halakhic Aspects

One can also examine halakhic life from a sociological viewpoint and fuse the two into a socio-halakhic perspective. The trend of moving to the suburbs not only wrought a profound change in Jewish life; it also forced the Orthodox community to behave differently than other Jews. The Orthodox Jew had to choose his residence within walking distance of a synagogue, even if he became a suburbanite. Thus, he lives close to other Jews. The Jew who travels on Shabbat does not have this limitation, even if he attends synagogue.

There is also a trend toward socialization and politicization in the area of kashrut. In the past, the halakhic discourse here remained in the private sphere and focused on a rabbi's deciding whether a chicken was kosher or *treif*, according to the circumstances. Today, due to the technological change leading to mass production, storage, distribution, and mass marketing, the question is whether there is a kashrut stamp on the package, and whether it is good enough in the eyes of the specific consumer. In Israel, the management of the large supermarket chains - which sell kosher items - must decide, for instance, which kashrut approvals from abroad are acceptable so that the products can be sold in their stores.

With the industrial production of food, the technological use of chemical and other analytical methods, and progress in national distribution systems, kosher products with the OU (Orthodox Union) stamp have now become much more widely available in the United States. A similar system may be introduced in Europe, but so far this has been hampered by the multitude of cultures and the much lower number of Jews. Similarly, deep-frozen or other types of kosher meals are now offered in many top hotels around the world.

Kosher products have also become more readily available internationally. Travelers can have kosher meals delivered or can take with them prepared meals of various types. With some brands, only hot water has to be poured over the food.

The development of mass production has led to another change. Many Jewish women no longer know how to prepare meat and chicken for kosher consumption, skills that their grandmothers would have considered obvious.

Changes in the Field of Learning

Technology is also changing the field of Jewish learning. New technological means play an important role: yeshivot that have introduced the computer may have a significant advantage over those that have not. New methods may cause continuous change, but there are also disadvantages: computer-based learning becomes much less "a part of oneself" than classic, book-based learning. Learning on Shabbat

and holidays, days that are especially dedicated to this purpose, cannot be done on computers by Orthodox Jews.

Rabbinical scholars are usually divided into two types: *Sinai*, indicating a person with an encyclopedic knowledge of rabbinical sources, and *oker harim*, "the uprooter of mountains," denoting a person with great creative capability. In the Talmud it is told that the Palestinian scholars were asked which of the two was preferable, as they had to choose as head of a school between R. Joseph, who had great knowledge, and Rabba, who was a creative scholar. The answer given was that the one with the greater knowledge was preferable.²¹

In our times, the equilibrium has the potential of shifting toward the *oker harim*. Today, through the use of electronic databases, he too has access to much of the knowledge that the *Sinai* type of scholar previously had to store in his mind.

This phenomenon also has other aspects. With increasing numbers of people having access to more and more electronically-stored Jewish knowledge, this may undermine the authority of the scholar who may have used only some of the sources. It is becoming easier to verify whether all possible input has been used in rabbinical decisions. This process is at too early a stage to assess what it may mean for rabbinical authority. It puts pressure on the status of scholars whose main skill is knowledge, and also alters their image.

A similar process has already occurred in general society, where the interested patient can easily acquire information about an illness before visiting his doctor.

With greater knowledge now available and technologies advancing, one could have imagined, for instance, that technological do-it-yourself kits for checking the color of blood and determining whether it is menstruation (*nida*) could be developed. This would replace rabbinical authority with a type of self-care. R. Shlomo Zalman Auerbach has decided against this.

Technology and Beit HaMidrash

Whoever studies Talmud or halakhot today can access the most important commentaries with a few clicks on the computer mouse. At a lower level of study, one can obtain many commentaries from numerous sources from the Internet, for instance, on the weekly Torah portion.

The Bar-Ilan responsa project has made responsa accessible that formerly had to be painstakingly sought out. It has become easy to search for what the key *poskim* (decision-makers) have had to say on particular subjects. In the past, the Jewish scholar needed access to a large library and had to have a phenomenal memory before he could develop his insights. Today, many perspectives on halakha and other Jewish issues can be developed with some of the base material accessible on CD-ROM. The number of classical texts available in this medium is gradually increasing. Yaakov Hacohen Kerner has discussed in a lecture another aspect of the computer's application in learning: its potential utilization for the development of responsa.²²

It is difficult to assess how the atmosphere of the beth midrash may change if one replaces a collection of books - with their special Jewish image - with the diskette. A radical change in atmosphere is represented by the virtual yeshiva that has been started by the Har Etsion Yeshiva. It provides lectures via the Internet on Bible, Talmud, and the world of Jewish thought. Against this background, the study group that finished the Daf Yomi program of the Talmud over a period of seven and a half years on a morning commute by train from Far Rockaway to Manhattan seems almost old-fashioned.²³

The greater accessibility to Jewish learning via modern technological means has numerous impacts. Some experts report that those wishing to convert to Judaism now often come with much more knowledge than was possible in the past, as the new media have made information so much more accessible.

Telecommunications

Another revolutionary technology with a strong impact is the field of telecommunications. The courses of the late Lubavitscher rebbe R. Menachem Schneerson and of R. Ovadia Yosef can now be heard all over the world through satellite transmissions. This is strengthening their influence compared to that of other rabbinical authorities.

Tapes of rabbinical courses, and of outreach from rabbis, have become a sizable industry. For example, at its American headquarters, the National Council of Young Israel had - by the turn of the century - a Torah tape library that "contains more than 2,500 audio cassettes on the weekly Parsha, Mishna Talmud (in English and Yiddish), and lectures on the holidays, Kashrut, Jewish philosophy, ethics and other topics of interest."²⁴

New entertainment techniques are also facilitating access to knowledge. On El Al flights, while most of the audio channels provide music of various types, one of them offers a Talmud course.

Genetic Analysis

The structure of family life is another area affected by technological developments. In ultra-Orthodox circles, the arranged marriage (*shidukh*) is the common procedure. Parents painstakingly seek out appropriate matches for their children. With an increasing number of genetic tests now becoming available, new elements are added to the considerations.

Another aspect of this is that, in general society, many prebirth tests are carried out and imperfect embryos are often aborted, thus decreasing the percentage of such children. As Orthodoxy opposes this practice, no such proportionate decline is taking place in that community. This may increase the percentage of Orthodox children among those with birth defects.

Seeking the Ten Tribes

A very different aspect of advances in genetics is whether the search for the ten lost tribes will be influenced by genetic analysis. Will this lead to new currents of mass immigration to Israel?

References to certain Third World tribes' genetic kinship of the Jews have appeared in the press. One study has identified a distinct Y chromosome among people who consider themselves descendants of the priestly subtribe of *Cohanim*. The incidence of this chromosome has been found to be much greater among such people than among ordinary Jews.²⁵

A second study has identified a substantially higher-than-usual percentage of this chromosome among the Lemba in northern South Africa and Zimbabwe. This tribe has an oral tradition of being descendants of Jews, and maintains some Jewish traditions such as circumcision. In one clan this chromosome has been found in more than 50 percent of the males, a percentage roughly similar to that found among *Cohanim*. Another study shows a high genetic correlation among most Jewish population groups, with the exception of Ethiopian Jews.²⁶

Although, from the halakhic point of view, belonging to the Jewish people is not influenced by genetic analysis, from the sociological one, knowledge about genetic correlation with the Jews may influence people to identify with Judaism, even to the point of converting. As this research is at such an early stage, at present this is speculation only.

Halakhic Aspects

Another important category of technological influence on Jewish life, relevant mainly to Orthodox Jews, concerns halakha. The development of new technologies has brought with it many halakhic challenges and the need for new halakhic decisions. At the same time, it stimulates better observance of halakha.

The Nature of Shabbat

The Shabbat halakhot are central in assessing the attitude of Orthodox Judaism toward technology. The technological developments of the past decades have led to many new responsa about what is or is not permitted on Shabbat.

There are some who believe that it will be possible in the future to bring about significant changes in the activities that can be carried out on Shabbat, for example, by applying various sensors.²⁷ In this context, a new question is arising: if it became possible, by applying various technological methods, to do on Shabbat almost everything that is possible on weekdays, would the atmosphere of Shabbat as known today turn into a halakhically binding value? In other words: would halakha forbid certain innovations because of their consequences?

Many appliances have alleviated the life of the Orthodox Jew. Heating food on Shabbat is the most obvious example: the variety of food that can now be introduced into the Shabbat menu has grown significantly. Cholent has lost its monopoly in Jewish communities originating from Eastern Europe, and many other dishes can now be heated using time clocks and electric plates.

Problems for the Traveler

Technological developments in the external world are imposing hindrances on the observant Jewish traveler outside Israel where there were none before. They are encountering an increasing number of hurdles on Shabbat, particularly in hotels. Many hotels have entrance doors controlled by an electronic eye and doors to rooms that can only be opened by electronic keys. Some Israeli hotels have two locks on their doors, one electronic and one regular, the latter for use on Shabbat by the Orthodox.

For security reasons, hotels worldwide are increasingly making access to their stairways difficult, and alarms are often set up against entry so that they have come to be used almost exclusively as emergency exits. Energy saving has led to another series of complications: sometimes lights go on when one reaches a floor. In some hotel rooms, one has to put one's key in a lock or against a magnet in order to switch on the light and air-conditioning. Thus, leaving the lights on for the whole of Shabbat becomes impossible.

Bars or cupboards in rooms often cannot be used because this leads to lights going on. Automatic fire extinguishers may turn the lighting of Shabbat candles in one's room into an unwanted shower.

Specific technologies also have an indirect influence, as they have also led to modern management techniques that are posing problems on Shabbat for Orthodox Jews. Many hotels now require the guest to sign on the bills for breakfast and other food items. In many cities, it is only in small hotels that the Orthodox traveler is not faced with any of these problems. Before going to a hotel where the Orthodox Jew plans to stay on Shabbat, he (or she) must ask many questions in order to find out whether one can stay there. Problems for Orthodox Jews, particularly in France, are increasing as in cities more and more buildings can only be accessed by using electronic codes.

Halakha and Jewish consumerism intersect in this field. For the Orthodox Jew, there is now a new consideration - beyond location and price - when searching for hotels to stay in on Shabbat. These technological developments are thus leading to behavioral changes.

In quite a few cities, even crossing streets on Shabbat has become a problem for the observant Jew, if one has to push a button to make the traffic lights change. Alternatively, one may have to wait a long time until another pedestrian comes along. Civil and halakhic rules are at cross purposes here.

Halakhic Technology Institutes

The many halakhic questions requiring technological research have led to the establishment of several specific institutes. These deal with various halakhic aspects of technological innovations and the challenges they are posing to the observant Jew. Some, such as the Falk Schlesinger Institute in [Jerusalem](#), are developing the background for new rabbinical rulings on medical and biological issues.

The Machon Mada'i Technologi leHalakha in Jerusalem and the Tsomet Institute in Alon Shvut are institutes of technical development. Many of the issues they are dealing with concern the Shabbat laws. Conventional actions that were formerly impossible on Shabbat can now be carried out with halakhically permitted tools. These institutes are developing equipment especially meant for observant Jews, and are thus "integrating" halakha and modern technology.

Some of the products of these institutes are meant for general situations, such as the Shabbat elevator. Modern technology has made it possible for observant Jews in Israel to live in high-rise buildings whose higher floors have formerly been inaccessible to them on Shabbat, as they do not use regular elevators. Many hotels and high-rise buildings with Orthodox inhabitants have a special preset elevator that is halakhically permitted for use on Shabbat.

Technology can also help to ensure the upholding of halakha in agriculture. One example is that an Israeli marketing board uses its aerial photographs to supervise new plantations and guarantee that the halakha of *orla* (the prohibition to use fruit from a newly planted tree during the first three years) is not transgressed. The Center for the Research of Agriculture According to the Torah is especially dedicated to study in this field.

Judaism, engineering, and technology meet in a very different way at the Jerusalem College of Technology, also known as Machon Lev. There, teachers and students of advanced technology are also immersed in Jewish studies.

Emergency Needs and Extreme Situations

Other products address emergency needs such as the use of electricity on Shabbat in hospitals, and security services. One example is the *gerama* switch, which makes it halakhically possible to switch electricity on and off on Shabbat. Electric cars for invalids to use on Shabbat are another example.

Some products address extreme or unique situations. One halakhic technology institute constructed a telephone that enabled an Israeli ambassador to use the phone on Shabbat. In the Israeli army a special pen is used by observant soldiers on Shabbat, whose ink-mark fades away after a certain period of time. Therefore their use is not considered a form of the writing that is forbidden on Shabbat. These pens are also used in hospitals.

Nevertheless, the issue often remains one of feeling whether the equipment fits into the "Shabbat sphere." One of the Israeli halakhic institutes has developed a microphone whose use is permitted on Shabbat, but only a few American orthodox synagogues use it.

Grouping Halakhot into Categories

Many responsa and publications have addressed the halakhic aspects of individual technologies. The specific Jewish positions on technology have hardly been analyzed, however. One effort has been made by R. Faitel Levin, who has grouped a number of seemingly different halakhic issues into several general categories, some of which have technological aspects:²⁸

1. The observation and control of phenomena once inaccessible: for instance, the microscopic visibility of bacteria.

2. The fragmentation of onetime wholes into several isolated components: for instance, what was once considered an indivisible fire can now be divided into four components, heat, light, combustion, and flame. This has numerous halakhic consequences.
3. Amalgamation: for instance, whether a *mikveh* (ritual bath) and its filter are one integral whole from a halakhic viewpoint, which has consequences as to whether it is halakhically suitable.

Kashrut

The advancement of analytical chemical methods has made analysis of kashrut more sophisticated. The technology behind mass distribution has also led to the greater international availability of kosher products.

Kashrut supervision is also influenced by technological methods. In Israel, Tnuva markets special *mehadrin* milk products, meaning they are not obtained from milking on Shabbat. An electronic eye in the milking shed helps to control this.

Technological developments in this field are also leading to new halakhic problems. According to Jewish law, if meat products accidentally fall into a milk dish, or the reverse, they may be eaten provided the alien element is less than one-sixtieth part. Modern technology enables one to take this alien element out, although halakha does not require it.

This is part of a much larger question: should one be more precise in the fulfillment of commandments now that technology makes it possible? There are many other examples. Before eating salads and other leafy vegetables, halakha requires checking whether they contain any bugs. One can identify smaller insects with modern analytical tools than with the eye. Again, halakha does not require it.²⁹

Improved Tools

A further concern is food analysis. Laboratories provide numerous new possibilities for investigating products. In a lecture a few years ago, Yosef Bodenheimer, president of the Jerusalem College of Technology, listed many examples in classical Jewish literature where the technological improvement of tools could enable more thorough fulfillment of the commandments.

There are areas in which the halakhic consensus has consciously decided not to use the best technology available.³⁰ Searching for leavened bread (*hametz*) before Passover with modern analytical methods is not required. /p>

The slaughterer's knife could now be checked by new electronic tools, saving both time and money. According to halakha, however, inspection by eye and the sensitivity of the thumbnail in investigating the kashrut of knives is sufficient.

Similarly, the computer has made it possible to check more accurately whether mistakes have occurred in the writing of a Torah scroll or a mezuzah even if, halakhically, eye-verification remains necessary. With advanced technology, one could also improve the dimension control of the square shape of *tefillin*.

A More Beautiful Way

R. Levi Yitschak Halpern is of the opinion that, as long as the above approaches are not generally practiced, one is not obliged to follow them. They should be considered as *hidur mitzvah* (a more beautiful way of fulfilling them without there being any halakhic obligation to do so).³¹ Only when it

becomes common practice to check *tefillin* or a mezuzah by computer does it become halakhically necessary to do so.

Yet another tool for improvement and mass production has been proposed by Ze'ev Lev: a method of creating perfect Torah scrolls by photographing a scroll that contains no mistakes and then optically projecting this text onto the parchment to be written on.³²

Is there a general trend in halakhic decision-making on these issues? One authority familiar with the field believes that, while mainstream rabbis in the field tend to look for permissiveness within the Shabbat *halakhot*, the opposite is the case regarding kashrut. An explanation is that, while the individual is free to choose what he eats, technological complications of life on Shabbat are imposed on him.³³

A further example of the way in which technology can improve the quality of Orthodox life is the *mikveh*. This can now be equipped with all modern comforts and can easily be heated. Various timers that control electric plates for warming the Shabbat meal and putting the lights on whenever required are further technological developments that make observant Jewish life easier.

The field of technological interaction with halakha is so vast that it is difficult to cover. It includes many diverse issues: for instance, dealing with life-prolonging technology and the determination of parenthood through DNA. Other examples are what blessing to say for hydroponically-grown produce,³⁴ the use of modern inks for Torah scrolls,³⁵ and whether a divorce can be granted in a video-conference.³⁶ Another emergent field is the Jewish attitude toward genetic engineering.³⁷

The exact determination of death according to halakha and its relevance for body-part implants (*hashtalah*) is another aspect of the impact of technology.

Technology and Experiments

The use of technological experiments to determine halakha has many more aspects. One classic, well-known example has led to the claim of rediscovery of the blue dye (*tchelet*) traditionally used to color the fringes (*tsitsit*) of the prayer shawl (*tallith*).

Experiments for verifying facts are already mentioned in the Talmud; however, scientific methods have been greatly refined since then, raising questions as to their halakhic consequences.

The issues to be dealt with are very diverse, however, as one more example proves. The Jerusalem College of Technology has developed new, fast photo-acoustic techniques for the analysis of *shaatnez* (forbidden mixture of cloths). Another issue concerns the way in which corpses are identified. DNA determination and the checking of dental patterns are more precise than the time-honored methods mentioned in the Talmud and the Shulhan Arukh.

The International Date Line

Others have studied halakhic problems connected with the International Date Line. There are differences between important *poskim* (rabbinical decisors) on what day the real Shabbat falls in places such as Japan, New Zealand, and Hawaii.³⁸ Another aspect is what happens with time-dependent commandments if one crosses the line.³⁹

Crossing the line became an issue for the observant Jewish traveler long ago, as he was confronted with the possibility of needing to keep two consecutive Shabbat days or not having a Shabbat at all. Many more questions have been asked on this issue. For instance, when is the correct day for the circumcision of a baby in such a situation? And if one crosses the line in the middle of the omer period, what day does one count?

R. Faitel Levin writes: "Some rabbinical authorities have differentiated between the various mitzvot. Some should be kept according to the place where one is going - such as Shabbat, holidays (other than

Shavuot), New Month, etc.; others should be kept according to the time of the place that one is coming from - such as circumcision, *omer*-counting, the Shavuot holiday, the redemption of the first-born, etc."⁴⁰

Nowadays, the issues have become even more complex. Levin has dealt with a number of such technological problems. He points out that technology has modified the classical notions of both date and time. Is somebody permitted to call by phone or send a telex from a place where it is not Shabbat to a place where, at that moment, it is? He asks "to which component of date do the Shabbat laws apply: the date at the place where the person is or the date where his activities are executed?" He quotes *poskim* that the determining date is the one where the person is.⁴¹

Some scholars are already dealing with space travel. Levin also refers briefly to some of the problems that may emerge in this regard in the future. An observant Jew in a spaceship will be confronted with a sunset every two hours; in a human settlement in remote outer space, the sun may always be visible. "In such situations, when does one put on one's *tallit* and *tefillin*; what is the permitted time for the morning prayer; when do Shabbat and holidays start?"⁴² He points out that various *poskim* have dealt with these issues.

Halakhic Impact on Technology

With so many technological aspects influencing the Orthodox Jewish way of life, are there fields in which halakha has stimulated the development of technology? These are difficult to identify, and only a few minor indications have been found.

The application of hydroponic cultures during the sabbatical year (*shemittah*) was thought to have considerable potential. This was applied, at Kibbutz Hafetz Hayim among others, but was not developed further.

Another development was that funding for the Bar-Ilan CD-ROM responsa project was made possible by an American public agency interested in developing data retrieval techniques.

Influence on Thinking, Imaging, and Conscience

Technology has also influenced the Jew's thinking and his conscience. This leads to new ways of presenting ancient concepts. Only a few examples can be given.

Our sages say that everything man does on earth is recorded in Heaven. The Hafetz Hayim refers to this, saying that one can acquire *emunah* (faith) from technology. He meant specifically the gramophone - a discussion or a word uttered in one place can be heard in another - or a film shot at home, which can be shown at other times and in other places, including in Heaven.

Today, it is easy to imagine that a molecular memory chip of a computer could contain man's entire life experience. Such a molecule could go to Heaven after 120 years. It shows man's life with the help of sophisticated audiovisual equipment. Man is then judged in the heavenly court, where the video of all his deeds and his inner feelings is screened. Man may be forced to see his own life film. Thus he will be faced with the potential of things he could have done, for better or worse, which might be painful. When other people also watch one's film, viewing what one wants to be kept secret, this can turn into one's Paradise or Hell (a variation on Sartre!). With technological advances and the passage of time, human perception of this process will also change.

A Seeing Eye

Let us consider another aspect of this contemporary reality: an Israeli accountant, working for a high-tech firm, rented a car in Florida. He got lost and activated the navigator system of his car, which guided him to

his destination. A voice in the car then announced: "You are almost there, but you have to cross to the other side of the road." At such moments, man realizes what it means to have "a seeing eye above him."⁴³

The surrounding world has a greater impact on the Jewish people through the mass media: radio, television, and the Internet. As a result, standards and norms of restraint are changing.

Electronic commerce and banking may lead to the obliteration of the sense of ownership. Can a fraudulent transaction by means of a mouse-click be considered a punishable act of theft in the halakhic sense?

Torah

Competition for the use of man's most precious possession - time - has become fiercer than ever before. Seeing Jewish youngsters sitting in front of a screen - computer or television - for hours, one may wonder what will happen to their Torah studies.

There are verses in Tanakh that have only attained clear meaning in our time. For example, "And I will bring you on eagle's wings" is an apt description of the Yemenite Jews' emigration to Israel in airplanes in 1948.

In light of technological expansion, one may interpret biblical texts in new ways. The verse: "The earth will be full of knowledge of God as water that covers the sea"⁴⁴ could be interpreted as referring to a world covered with electromagnetic waves, representing audio and video transmissions, spreading the "word of the Lord from Jerusalem" all over the world.

The Philosophical Perspective

Another important area of interaction between technology and Jewish life concerns philosophical aspects. The halakhic way of life uniquely confronts the technological changes that have so altered modern man's life experience.

Contemporary philosophers are concerned about the place of technology in society. Meanwhile, some of their questions have become common in the general media, such as: "Does man dominate the machine or is technology slowly getting the upper hand over man?" Some claim that the machine is an extension of man and will remain so. Many are worried, however, that man has become dangerously dependent on machines. Some even speak of the "fusion" or "harmonious merger" of man and machine or microchip into a single inseparable entity, or claim that this has been achieved almost without anyone's noticing.

Others are afraid that the machine is becoming increasingly powerful, that technology is becoming autonomous and man is becoming its instrument. This attitude is sometimes reflected in science fiction books.

Numerous Predictions of Doom

Predictions of doom may be found among many professions. The American computer expert Bill Joy published a much-quoted article in which he asserted that twenty-first-century technologies such as genetics, nanotechnology, and robotics are so powerful that applying them to weaponry may lead to huge disasters; disturbingly, these are accessible to small groups and even individuals.⁴⁵ The terrorist attack on the United States on 11 September 2001 has shown that major disasters can be perpetrated even by more classical technological means.

Apocalyptic predictions also concern other aspects of human activity, including environmental developments. Global warming may lead to a serious climatic deterioration within a few decades. According to many scientists, this is caused by man-made greenhouse gases, a phenomenon difficult to control because of the expansion of populations and economic activities.⁴⁶

One of the best-known twentieth-century pessimistic philosophers of technology is the Frenchman Jacques Ellul. More than fifty years ago he analyzed technology's impact on society, stating, out of a deep Protestant belief, that technology⁴⁷ "has taken substance and become a reality in itself. It is no longer merely a means and an intermediary. It is an object in itself, an independent reality with which we must reckon."⁴⁸ Twenty years later, he wrote: "Technology has an absolute domination on the environment: it evolves according to its own logic."⁴⁹

A recurring theme in the philosophical discussion on technology is that it liberates people from the yoke of physical labor; it is debatable to what extent this is positive or negative. An important positive development is that as so many food products are machine-made, people have more free time. Another important aspect is that technology results in "the loss of closeness to nature."⁵⁰

Shabbat: Forgoing the Use of Many Objects

The observant Jew's attitude toward technology is different from that of others: he is frequently faced with its impact at times when general society may allow itself to take it for granted. For instance, there is a difference in his use of technology at specific times. During the week, the Jew applies technology like anybody else. On Shabbat, he steps back from it in a well-defined manner. Many aspects of transport, communication, information, and leisure are not used within the normative framework of a *shomer Shabbat* (Shabbat observer). This abstinence leads to a unique atmosphere on Shabbat, in which family life and learning play an important role.

A key characteristic of Shabbat and holidays is that the observant Jew forgoes the use of many objects. This behavior toward equipment leads, among other things, to a severe limitation of his mobility: he uses neither an automobile nor public transport. As early as the nineteenth century, rabbis decided that it was forbidden to use railways on Shabbat. For observant Jews, not using these means of transport means more walking on Shabbat than during the week. One might describe this as: refraining from the mechanical in favor of the natural and immediate.

The same abstinence is observed in the use of many other important appliances and tools such as money, television, radios, computers, electric switches, telephones, faxes, elevators, electric doorbells, pens, purses, cash machines, copiers, compact discs, washing machines, and dryers. It should be noted that several of these were not common in people's homes or in the public square ten or twenty years ago; nonetheless, Jews had to refrain from using many elements of the technology available at that time.

The use of electricity is limited to reliance on preset clocks. This affects such basic activities as lighting and the preparation of food. An electrical cut during the week forces one to remember to reset the clock. Some ultra-Orthodox in Israel go beyond this and refrain from using electricity on Shabbat generated by the work of other Jews. Some have their own generators.

Many other examples can be given as technology and its artifacts have become so integral a part of modern life. Besides transportation, information, communication, and leisure, artifacts not used on Shabbat also affect many other areas of activity. The observant Jew's abstinence from using technology on Shabbat resembles in some ways his fasting from all food and drink on specific days. In both cases man enters a special state of mind and discovers deeper layers of his self.

Surpassing Civilization

Both Abraham Joshua Heschel and David Novak have linked the Jewish attitude toward technology to Shabbat observance. Heschel defined Shabbat as the day "on which we learn of surpassing civilization."⁵¹ He added that it is "a day on which we would not use the instruments which have so easily turned into weapons of destruction...on which we stop worshipping the idols of technical civilization...." He asked: "Is there any institution that holds out a greater hope for man's progress than the Shabbat?"⁵²

He thus saw a solution to man's problematic relationship with technology in obtaining some degree of independence from it, rather than renouncing it completely. He considered technology an external gift to which the Jew's proper attitude should be: "to have them and to be able to do without them. On the Sabbath we live, as it were, *independent of technical civilization*: we abstain from any activity that aims at remaking or reshaping the things of space. Man's royal privilege to conquer nature is suspended on the seventh day."⁵³

This argument was developed further by Novak:

Automatic technology need not be stopped for the Sabbath as long as it does not require human attention on the Sabbath. In other words, as long as it permits its makers and even its attendants to transcend it.... Judaism not only does not demand the renunciation of technology per se but also does not require that technology rest with us on the Sabbath. What it does require is that it serve humans on the Sabbath and not disturb their rest by requiring their attention. Limiting technology does not mean crippling it.⁵⁴

Confronting the Philosophers of Technology

Philosophers encounter difficulties in analyzing technology because, for them, living without it is largely a theoretical exercise. When making suppositions about a less technology-dependent reality, they are not able to judge this based on their own lifestyle. In Judaism, however, there can be no fusion of man and machine; even if this happens on weekdays, Shabbat interrupts the process. Philosophers cannot imagine either what such behavior means, nor what perspectives may be obtained from the observant Jew's way of life.

For the observant Jew this should be much easier to understand: his life alternates between immersion in - during the week - and detachment from - on Shabbat - a reality based on technology. This alternation in behavior at preset times is so naturally and self-evidently Jewish that many observant Jews do not believe it merits analysis. They do not realize that, through this behavioral approach, Judaism offers a unique message to the outside world.

The Exciting and the Trivial

The observant Jew's behavior offers a pragmatic answer to the abstract question with which the non-Jewish philosopher wrestles. The Orthodox Jew's lifestyle could potentially provide a case study for the philosopher, but neither is aware of this. What can be exciting for the philosopher of technology is trivial for any Jew who keeps the commandments. The latter knows that cutting oneself off from technology is not only possible, but also enlarges one's horizons, despite its seeming to narrow them.

The Orthodox Jew undergoes enriching experiences on Shabbat that partly derive from his controlled and limited use of technology. That can be considered a contemporary rephrasing of what Ahad Ha'am said: "More than that the Jews have preserved the Shabbat, the Shabbat has preserved them." Thanks to Shabbat, the Jew cannot be fully addicted to various appliances such as the television or systems such as the Internet.

What - from the outside - could be considered the constraints of an ancient or even obsolete system, may have new meaning for general society: for example, when traveling by private car was forbidden in some cities on specific days during the Western oil crisis. This restriction is now more common in the West due to air pollution. In this way, many non-Jews are also exposed to what one might call a limited secular "Shabbat observation." People have often said that their lives have been enhanced by not using their car for one day a week.

Some environmentalists believe that one must live differently with technology and thus abstain permanently, for instance, from owning a car. Many people are too poor to have access to major

technological achievements. The Amish forgo many artifacts during their entire life. The normative Jewish attitude toward technology, however, is not only unique but also much more complex.

The camper who lives for a while in the wilderness, renouncing many technological tools, also lives partly detached from the technological experience. He may undergo this, however, as a romantic or even near-pagan experience. The nature lover returns to nature, whose Darwinistic principles Judaism has stood against from its beginning. Halakha is the antithesis of the laws of Nature; the latter are cruel, without either charity or mercy.⁵⁵

Judaism proposes a model of nonsubordination to technology. At the same time, it opposes many of the highly problematic values of the naturist trends.

The Jew's Different Perspective

The Jew's binary behavior toward technology expresses a different perspective on the world from that of the Gentile: one of looking at technology from the inside - as a user - and from the outside - as an observer. This particular perspective enables one to better understand the limits of technology and its influence on man.

The Jew has to abstain from thirty-nine types of work on Shabbat, including weaving with a loom and plowing. Before modern times this gave him a different perspective on life from his Gentile environment. Today, however, this specificity has become much more intensive and particular to Judaism.

Many more insights about the interaction of technology and Judaism can be developed. Postmodern society is struggling to find a lasting system of values. The use of technology is one area in which the coherent value system and practices of Judaism provide a perspective on widespread contemporary problems.

The Domain of Holiness

Shabbat is a key example of a broad field in which the specifically Jewish attitude toward technology predominates. Researching further, one finds additional examples of this approach. For instance, Torah scrolls and mezuzot must be handwritten by expert scribes in a way prescribed in great detail, since machine-produced scrolls are considered unsuitable for religious purposes. A shofar has to meet strict conditions that make it irreplaceable by more advanced instruments. Another limitation of the use of technology is that one must bury books containing God's name rather than recycling them.

The interaction between Jewish life and technology is thus expressed very explicitly in the domain of holiness. This goes further than what Heschel and Novak claimed for Shabbat alone. This particular aspect of Judaism cannot be directly subordinated to technological developments; at most, these are used when necessary, but always in line with Jewish law.

The use of technology is also limited with regard to other religious functions. For example, water from the regular water supply system cannot be used for the *mikveh*.

Another difference from the Gentile world is that, whereas many non-Jews expected that the machine would free them from work and liberate time for leisure and pleasure, the observant Jew knew that this freed time would enable him to learn more. The age of technology has created greater individual wealth; this has enabled many Jews to gain the financial means that allow their children to study Judaism. The blossoming of Jewish learning in our day is a direct result of the wealth that technology has brought society, even if many of those who devote all their time to Jewish study are relatively poor.

Should Technology Be Optimized?

Another very basic question that philosophers pose is whether man may use optimal technology for every purpose. This question usually emerges in the context of war and destruction. The Bible addresses this issue in various places. The commandment of *bal tashkhit* ("do not destroy"), forbidding wanton destruction, indicates that some technological methods are not permitted for certain tasks:

When in your war against a city you have to besiege it a long time in order to capture it, you must not destroy its trees, wielding the ax against them. You may eat of them, but you must not cut them down. Are trees of the field human to withdraw before you into the besieged city? Only trees that you know do not yield food may be destroyed; you may cut them down for constructing siege works against the city that is waging war with you, until it has been reduced.⁵⁶

Although the environmental aspects of this subject are most often discussed today,⁵⁷ the technological ones are also of paramount importance. In non-environmentally relevant situations as well, Jewish law limits the use of technology. The Bible identifies certain technological artifacts with violence: "And if you make for Me an altar of stones, do not build it of hewn stones; for by wielding your tool [sword] upon them you have profaned them."⁵⁸ The same law is repeated in the Book of Deuteronomy: "There, too, you shall build an altar to the Lord your God, an altar of stones. Do not wield an iron tool over them; you must build the altar of the Lord your God of unhewn stones."^{59,60}

Johan Ben Zakkai says: "What is so bad about iron that it is disqualified among metals? The sword is made from it, which is a symbol of violence. The altar is a symbol of forgiveness [*kapparah*]. One cannot use a symbol of violence in presence of a symbol of forgiveness."⁶¹ This motif is repeated in various forms in other classical Jewish sources. One of these says that the altar symbolizes peace between the Israelites and God.⁶² Another states that iron was created to reduce man's days and the altar, to lengthen his days; thus it is not right to brandish a tool that shortens life over an object that lengthens life.⁶³ This commandment shows that, even in preindustrial society, Judaism suboptimized technology in certain cases. It would have been much easier to build the altar using iron tools.

The Tower of Babel

The biblical narrative contains texts that directly parallel halakhic teachings. The story of the Tower of Babel is the key paradigm of wrongful use of technology in - what in our eyes is - the pretechnological world of the Torah. Here man is condemned for striving, through technology, to attain achievements that God does not consider desirable. This biblical position may be read as warning blind admirers of technology that its use should be limited.

Meir Tamari states:

The Tower of Babel served no defense purpose, not did it serve as a storehouse, nor was it an industrial plant; in fact it served no useful purpose. The tower was simply a symbol of arrogance, erected "to make a name for ourselves." They saw their technology and science solely as the product of human wisdom but never as a divine gift. As such, all and every purposes predicated by that wisdom or serving it, was legitimate.⁶⁴

In Norman Lamm's opinion, human creativity is

an expression of man's God-likeness. Certainly one ought not see in this capacity of mankind a challenge to divine creativity; this, indeed, was the error of the builders of the Tower of Babel. When primitive man rubbed two stones together and produced a spark, he was not displacing God's creation of light and fire; he was exercising his divinely ordained vocation of creativity for enhancing the material world by use of his talents, and was thereby imitating God who said "Let there be light." The invention of the scissors was a creative extension of the human hand, the automobile of the human foot, and the computer of the human brain.⁶⁵

A Skeptical Attitude?

From a contemporary perspective, Daniel Elazar senses a skeptical attitude toward technology in another biblical story. He comments on the technological capabilities of the family of Cain:

...humans are too clever. In the course of eight generations they manage to use their inventive skills to invent technologies that make life easier and more pleasant. Moreover, the Bible tells us that it is precisely the Cain family, founded by the first murderer, that has the requisite inventive ability. Both technological and aesthetic inventiveness, then, are tied to murder and urbanization by the Bible.⁶⁶

Many technologies and their application are mentioned in the Bible, but without any hint of skepticism. Some simple aspects of the Israelite application of early types of technology can be seen in the biblical references to the various cloths dyed for use in the Temple, or the preparation of the incense burned there.

When the Israelites enter their land, the Bible describes it as "a land whose rocks are iron and from whose hills you can mine copper."⁶⁷ This text indicates that using the earth's nonrenewable resources is a normal human activity. A text from Isaiah makes this even clearer, as God says: "It is I who created the smith to fan the charcoal fire and produce the tools for his work; so it is I who create the instruments of havoc."⁶⁸

Sacred Requirements

A skeptical view of technology, however, is expressed in a Talmudic midrash: the best technical experts are unable to repair pieces of Temple equipment. The Talmud seems to indicate here that the sacred requires more than mere technology in the matter of manufacturing and maintenance:

In the Temple there was a cymbal out of copper and it had a nice sound. When it was damaged, the sages let craftsmen come from Alexandria in Egypt. They repaired it but it no longer had a good sound. Then they had the repair removed, and it had a good sound as before.⁶⁹

In the Temple there was also a mortar from copper which dated from the days of Moses, and it was used to season the incense [because its fine tone improved the product]. When it was damaged they brought craftsmen from Alexandria in Egypt and they repaired it. But it didn't season as before.⁷⁰

Agassi develops a secular variant of the argument that there is what might be called "something beyond technology." He points out that, in each technological field, one finds people with "golden hands" such as researchers, surgeons, garage mechanics, and designers. He adds: "Golden hands are beautiful to watch; yet we do not know where to place them in the scheme of things. They perform what cannot generally be guaranteed; yet they can be guaranteed to perform - and even to perform beautifully. Nor is it merely a feel: there is much more to it than a feel when a surgeon...is the artist with the golden hands...."⁷¹

Concluding Remarks

Judaism does not admire technology, but neither does it see it as dangerous per se. Nevertheless, Jews are often much more aware than others that science cannot be pure and that technology cannot be neutral. A nation that has undergone the Shoah, in which technology was used to accelerate mass murder, understands it as a paradigm of the sustained, systematic use of science and technology for destructive purposes.

This overview provides examples that illustrate our initial observations. First, technology has had a strong and specific impact on the Jewish people; second, an ongoing assessment of the interaction between technology and Judaism would be fruitful in many regards. Developing a more detailed analysis of technology and Jewish life will open up new horizons for learning, studying, thinking, research, deciding halakha, and making practical decisions.

To conclude on a positive note: one thing that technology has enabled us to do is to live longer. Thus, the average Jew can fulfill the commandments for a longer period of time.

* * *

Notes

1. An abbreviated version was presented in two lectures at the Seventh Conference on Torah and Science at Bar-Ilan University, April 2000.
2. The authors are grateful to Profs. Yosef Bodenheimer, Aviesri Fr?nkel, and the late Ze'ev Lev and to the rabbanim Levi Yitschak Halpern, Yisrael Rosen, Moshe Stern, and Faitel Levin (Australia) with whom they have discussed certain parts of this article.
3. Genesis 4:22.
4. Rashi on Genesis 4:22 and Bereshit Raba 23:3.
5. Genesis 5:29.
6. Midrash *Tanhuma* 23:3.
7. Mario Bunge, Introduction, in Joseph Agassi, *Technology: Philosophical and Social Aspects* (Dordrecht: Reidel, 1985), p. xii.
8. *Ibid.*, p. 26.
9. See Manfred Gerstenfeld, "Neo-Paganism in the Public Square," *Jewish Political Studies Review*, Vol. 11, Nos. 3 & 4 (Fall 1999), p. 18.
10. See, e.g., "Those Who 'Wrestle with God,'" *Jerusalem Post*, 9 June 2000.
11. For some examples, see Alvin Radkowsky, "The Relationship between Science and Judaism," in C. Domb and A. Carmell, eds., *Challenge: Torah versus Science and Its Problems*, 2nd rev. ed. (Jerusalem: Feldheim, 1978), p. 88.
12. Daniel J. Elazar, *Community and Polity: The Organizational Dynamics of American Jewry* (Philadelphia: Jewish Publication Society of America, 1976), pp. 96-97.
13. *Ibid.*, p. 96.
14. Interview with Daniel J. Elazar, in Manfred Gerstenfeld, *Israel's New Future: Interviews* (Jerusalem: Rubin Mass/Jerusalem Center for Public Affairs, 1994), p. 105.
15. Menachem Friedman, *The Haredi (Ultra-Orthodox) Society: Sources, Trends and Processes* (Jerusalem: Jerusalem Institute for Israel Studies, 1991), p. 149 (Hebrew).
16. See, e.g., Rochelle Furstenberg, "The Flourishing of Higher Jewish Learning for Women," *Jerusalem Letter*, No. 429, Jerusalem Center for Public Affairs, 1 May 2000.
17. Interview with Rabbi Abraham Cooper, by Manfred Gerstenfeld, "Anti-Semitism and Terrorism on the Internet," *Post-Holocaust and Anti-Semitism*, No. 9, Jerusalem Center for Public Affairs, 1 June 2003.
18. Manfred Gerstenfeld, "Identities, Pluralism, and Israel-Diaspora Relations," *Jewish Political Studies Review*, Vol. 11, Nos. 1 & 2 (Spring 1999), p. 35.
19. "Surfing past the Rabbis," *Jerusalem Report*, 28 February 2000.

20. *Yediot Aharonot*, 7 January 2000.
21. Bavli *Brahot* 64a.
22. "A Computerized Talmid Chacham: Is That Possible?" lecture presented by Yaakov Hacoheh Kerner at the Eighth Conference on Torah and Science at the Jerusalem College of Technology, 2 April 2001.
23. "Riding the Talmudic Rail," *Viewpoint*, Fall 1999, p. 25.
24. "Torah Tape Library Dedicated in Memory of Herman Rosenbaum," *Viewpoint*, Fall 1999, p. 20.
25. For a brief overview, see Hillel Halkin, "Wandering Jews - and Their Genes," *Commentary*, September 2000, pp. 54-61.
26. Ibid.
27. Personal communications by Ze'ev Lev and R. Yisrael Rosen.
28. R. Faitel Levin, "Halacha in the Modern Technological Age," *Or HaDorom*, No. 4 (Summer 1987), pp. 43-76.
29. Yoseph Levi, *Parashat Shmini*, 29 March 2000, from: torahandscience@avoda.jct.ac.il.
30. Personal communications by Yosef Bodenheimer and Yehuda Levi. Both offer substantial proof from halakha.
31. R. Halperin, personal communication.
32. Ze'ev Lev, HaMada beSherut haHalakha, *Torah shebeAl-Peh*, 1984, pp. 119-23 (Hebrew).
33. R. Rosen, personal communication.
34. R. Ari Hier, "The *Bracha* for Hydroponically-Grown Produce," *Journal of Halacha and Contemporary Society*, No. 17 (Spring 1994), pp. 112-19.
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37. For an overview, see, e.g., Akiva Wolff, "Jewish Perspectives on Genetic Engineering," *Jewish Environmental Perspectives*, No. 2, Jerusalem Center for Public Affairs (October 2001).
38. R. David Heber, "A Traveler's Guide to the International Dateline," *Viewpoint*, Fall 1999, pp. 61-64.
39. See, e.g., R. Faitel Levin, "Heker haHalakha b'Idan haTechnologia haHadasha," *Tehumim*, 1986, p. 479ff. (Hebrew). English version: "Travel in Halacha: "Time-Relative Mitzvot," *Or haDorom*, No. 6 (Summer 1989), pp. 66-109.
40. Ibid., p.479.
41. Ibid., p. 481.
42. Levin, "Heker haHalakha," p. 483.

43. Pirkei Avot 2:1.

44. Isaiah 11:9.

45. Bill Joy, "Waarom de toekomst ons niet nodig heeft," *NRC Handelsblad*, 31 August 2000 (summary in Dutch translation from original article in *Wired* magazine).

46. See, e.g., Manfred Gerstenfeld, *Environment and Confusion*, 2nd ed. (Jerusalem: Jerusalem Institute for Israel Studies/Rubin Mass, 2002).

47. Ellul's English translator used his French term technique.

48. Jacques Ellul, *The Technological Society* (New York: Knopf, 1967), p. 63. Originally published in French as *La Technique ou l'enjeu du siècle*, 1954 (French)

49. Jacques Ellul, *Le Système Technicien* (Paris: Calmann-Lévy, 1977), p. 131 (French).

50. E. Cassirer, quoted in Friedrich Rapp, *Analytical Philosophy of Technology* (Dordrecht: Reidel, 1981), p. 122.

51. Abraham Joshua Heschel, "The Sabbath," in *The Earth Is the Lord's and The Sabbath* (Cleveland and New York: Meridian Books), 1963, p. 27.

52. *Ibid.*, p. 28.

53. *Ibid.*, pp. 28-29.

54. David Novak, *Jewish Social Ethics* (New York: Oxford University Press, 1992), pp. 149-50.

55. Gerstenfeld, "Neo-Paganism," p. 30.

56. Deuteronomy 20:19-20.

57. See Manfred Gerstenfeld, *Judaism, Environmentalism and the Environment* (Jerusalem: Jerusalem Institute for Israel Studies/Rubin Mass, 1998), p. 112ff.

58. Exodus 20:22.

59. Deuteronomy 27:5-6.

60. The commandment is repeated in the Book of Joshua: "...upon crossing the Jordan, you shall set up these stones, about which I charge you this day, on Mount Ebal, and coat them with plaster. There, too, you shall build an altar to the Lord your God, an altar of stones. Do not wield an iron tool over them...." Joshua 8:31.

61. *Mekhilta d' R. Shimon Bar Yochai* 20:22.

62. *Mekhilta d'Rabbi Yishmael, Yithro, Masechta Debechodesh 11:ki charbega.*

63. Sifra, Kedoshim 10:10.

64. Meir Tamari, "The Challenge of Prosperity," 5 January 2000, from: torahandscience@mail.jct.ac.il.

65. R. Norman Lamm, "Extraterrestrial Life," in Domb and Carmell, *Challenge*, pp. 386-87.

66. Daniel J. Elazar, *Covenant and Polity in Biblical Israel: Biblical Foundations and Jewish Expressions*, Vol. 1 of *The Covenant Tradition in Politics* (New Brunswick, NJ: Transaction, 1995), p. 157.

67. Deuteronomy 8:9.

68. Isaiah 54:16.

69. Bavli *Arakhin* 10b.

70. Ibid.

71. Agassi, *Technology*, p. 38.

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DR. MANFRED GERSTENFELD is chairman of the Board of Fellows of the Jerusalem Center for Public Affairs. He is an international business strategist who has been a consultant to governments, international agencies, and boards of some of the world's largest corporations. Among his ten books are *Europe's Crumbling Myths: The Post-Holocaust Origins of Today's Anti-Semitism* (JCPA, Yad Vashem, WJC, 2003); *American Jewry's Challenge: Conversations Confronting the 21st Century* (Rowman & Littlefield, 2005) and, most recently, *Israel and Europe: An Expanding Abyss?* (JCPA and Konrad Adenauer Stiftung, 2005).

PROF. AVRAHAM WYLER lectures in physics and technology of materials at the Jerusalem College of Technology. He holds a doctorate from the Delft University of Technology in the Netherlands where he is a consultant to the National Research Institute of Metals. He is an ordained rabbi.