Halachic Applications of Artificial Intelligence

Artificial Intelligence and HALACHA

Navigating the New Frontier Across the Four Sections of Shulchan Aruch

Rabbi Josh Flug
Director of Torah Publications, RIETS

Over the past decade, many people have reflected on the role Artificial Intelligence and machine learning should play in shaping various aspects of our lives. Observance of halacha is no exception. Whether we realize it or not, AI is embedded in the technology that we use, and its impact is expanding. This article explores the wide-ranging impact of AI through the lens of halacha, examining its intersection with all four sections of the *Shulchan Aruch*: *Orach Chaim* (laws of daily and ritual practices), *Yoreh De'ah* (personal practices and prohibitions), *Even Ha'Ezer* (family law), and *Choshen Mishpat* (monetary law). We will present a relevant halachic application from each section, accompanied by sources and resources for further learning.

Orach Chaim: Shabbos and Smart Homes

Smart homes are residences equipped with devices and appliances that can be controlled remotely through a computer, smartphone, or other smart technologies. Smart homes integrated with machine learning devices can adapt settings automatically to match the preferences of individual users. For example, let's say a smart home is set with the following settings: when the parents are home, the thermostat should be set to 73 degrees, the window shades should be open, and the lights should be dimmed. When the teenage kids are home (without the parents), the thermostat should be set to 68 degrees, the shades should be closed, and the lights should be bright. How does the smart device know who is home? Currently, smart homes utilizing this technology primarily rely on identifying which smartphones are connected to the home Wi-Fi network. Yet as technology evolves, and especially on Shabbos, when the members of the household don't use their phones, the smart home can learn other ways to determine who is home. First, it might use facial recognition as a household member passes in front of a camera. Second, it might use voice recognition if a voice assistant device (Amazon Alexa, Google Home, etc.) is running. Third, it might use complex calculations to determine how many people are in the home based on how

long the heater or air conditioner takes to cool or heat the home. Each of these three methods (motion, voice, presence) present unique challenges as they relate to Hilchos Shabbos.

Motion: The issue of walking in front of a facial recognition camera might initially seem analogous to passing by a standard security camera. In today's world, it's nearly impossible to avoid being captured on surveillance footage while walking from one place to another, and several rabbinic authorities permit walking in front of conventional security cameras on Shabbos.[1] However, upon closer examination, these two scenarios are fundamentally different. The permissibility of passing by a standard security camera depends on several factors. Most notable is the fact that when someone steps in front of a security camera, his primary intent is to walk from one place to another, not to be recorded on camera (*davar she'aino miskvaen*). While the situation may be unavoidable (*pesik reishei*), being on the camera is of no consequence to the passerby (*pesik reishei d'lo nicha lei*). Additionally, many poskim assume that even intentionally recording digital video footage is not a biblical violation of Shabbos. When passing by is considered *pesik reishei d'lo nicha lei* and the nature of the violation is rabbinic in nature, there is room for leniency.[2] Some poskim[3] also suggest that when an action is triggered by motion rather than direct contact, any violation would hinge on the principle of *meleches machsheves* (intentional, creative labor required for a Shabbos violation). This principle only applies when there is specific intent to activate the camera.

These leniencies would not apply to a system that adjusts a thermostat based on facial recognition. The user specifically wants his face to be recognized so that the proper adjustments can be made. This constitutes a *pesik reishei d'nicha lei.* If the thermostat is adjusting the heating system, it would be a violation of a biblical prohibition. Furthermore, *meleches machsheves* would apply here since the user wants to be on the camera.

Voice: Facial recognition software is triggered when the user walks past a camera. What if the trigger is not through an action performed with one's body but rather with one's voice? The Gemara, *Bava Metzia* 90b, discusses the status of a prohibition that is violated when one controls an animal with his voice. For example, it is prohibited to lead two different species of animals to plow a field together. What if instead of leading the animals physically, one leads them by talking to or yelling at them? Rav Yochanan, who is considered the normative opinion, holds that it is the same violation. While there is room to distinguish between a direct voice command ("Alexa, turn on the lights") and a situation where the system understands that the user is home based on voice recognition, this distinction may be limited to the severity of the prohibition and would not serve as grounds to permit operating such a system on Shabbos.[4]

Presence: If a person is in a room and then a smart device subsequently counts how many people are in the room, does that pose a problem on Shabbos? Can one violate Shabbos merely by being present in a place where presence determines the actions of a device? The Gemara, *Bava Kama* 10b, discusses the following situation: Five people are sitting on a bench. A sixth person then sits down on the bench and the bench breaks. The Gemara, in discussing why the sixth person must pay, implies that if the bench had collapsed under the weight of the first five alone, they would have been responsible for the damage. This indicates that merely sitting on a bench is considered a direct action with potential liability.

However, this scenario is not exactly comparable to our situation for two reasons. First, if five people sit on a bench at 9:00 and then the bench breaks at 9:10, the process that caused the bench to break began at 9:00, not at 9:10. The breaking of the bench was caused by them sitting on the bench, not simply being on the bench. At 9:10, these individuals learned that their actions at 9:00 is what caused the bench to collapse. Second, the halachic standards for what constitutes a direct

violation of Shabbos and for what constitutes a direct cause of damage might not be the same.

R. Shlomo Zalman Auerbach, *Minchas Shlomo* 1:91 (10), discusses the issues of presence as it relates to automated elevators. Suppose Reuven enters an elevator and then subsequently the doors close and the elevator goes down (either because someone else in the elevator pressed the button or because it is set up to stop at every floor). Because Reuven is now in the elevator, there is a possibility that less electricity will be used to power the elevator and the lights in the building may be slightly brighter than if he wasn't in the elevator (whether this is factually accurate is debatable, but R. Shlomo Zalman is working with this assumption). Should we assume that Reuven's presence in the elevator is problematic? R. Shlomo Zalman asserts that since another event takes place after Reuven enters the elevator, his entering the elevator does not contribute to any action and the elevator is only reacting to his presence. R. Shlomo Zalman brings a number of proofs that when a *melacha* takes place as a reaction to the presence of an individual, that individual does not violate Shabbos.

R. Shlomo Zalman's ruling should apply to our situation as well.

If a smart thermostat adjusts its settings based on the energy needed to heat or cool the home, determined by the number of occupants, it is responding to their presence rather than being directly triggered by their entry into the house.

Yoreh Deah: Talmud Torah in the Age of Brain Interfaces

In January 2024, Noland Arbaugh, a quadriplegic who was injured in a diving accident, received Neuralink's first brain implant chip. Neuralink, a company founded by Elon Musk, is developing chips that will allow users to interface with a computer or mobile device. Currently, Arbaugh is able to control a computer mouse with his thoughts, but Musk has bigger goals. He envisions a future where humans will communicate through telepathy, stating, "Ultimately, we can do a full brain-machine interface where we can achieve a sort of symbiosis with AI."

Hopefully, brain implants will give new hope to those with impairments and disabilities. At the same time, brain implants for "enhancement" purposes raise significant ethical questions. Consider this scenario: if an implant could provide instant access to an entire Torah library—or even a portion of it—without having to lift a finger or look at a screen, would that be appealing from the perspective of the mitzvah of *talmud Torah* (the mitzvah to study Torah)? Would gaining the knowledge base of Rav Ovadia Yosef or Rav Chaim Kanievsky, without dedicating the time and effort to actually learn those texts, truly fulfill the mitzvah?

There are two aspects to the mitzvah of *talmud Torah*. First there is a mitzvah to spend as much time as possible studying Torah. Second, there is an obligation to try to master the entire Torah.[5] Would getting such an implant contribute towards the obligation of mastering the Torah?[6]

There is a particular passage in the Gemara that seems very relevant. The Gemara, *Niddah* 30b, states that in-utero, a person is taught the entire Torah. When he exits into the world, an angel slaps him on his cheek causing him to forget everything he learned. What is the purpose of this exercise? Why teach the child all this information only to forget it upon entering the world?

The Vilna Gaon (Mishlei 16:26 and quoted by his brother in *Ma'alos HaTorah*) suggests that the answer lies in three words in the Gemara, *Megillah* 6b, *yagati umatzasi ta'amin*, if someone says that they toiled (in Torah study) and found (the truth), we should believe him. There are two points the Gemara is highlighting. First, the purpose of Torah study is not simply to acquire knowledge. The purpose is to toil in the study of Torah so that the learning experience is transformative and that the learner's actions and behaviors parallel his knowledge. This is why the baby must forget everything learned in-utero. Torah knowledge gained without the toil is not useful. Furthermore, we don't want this child's knowledge to be ahead of his actions and behaviors. If he knew the entire Torah, he would be held to a very high standard for his actions and behaviors. That's why all that knowledge is deleted when entering the world. Second, the Gemara uses the word *matzasi* (found it) specifically because it is much easier to acquire something that we once owned and then lost. The Torah knowledge acquired through toil comes to us more easily because we once learned it in-utero and then it was lost.

The Vilna Gaon's analysis of the passages in *Niddah* and *Megillah* clearly

indicate that it would not be advisable to "download" the Torah onto one's brain. Yet there is another idea of the Vilna Gaon that is even more directly related. R. Chaim Volozhiner, the Vilna Gaon's primary student, relates in his introduction to *Sifra D'Tzniyusa*, a collection of mystical insights by the Vilna Gaon, that there were a number of occasions where *maggidim* (angels) approached the Vilna Gaon offering to reveal some of the hidden secrets of the Torah. The Vilna Gaon rejected these opportunities saying that if there are truths to be uncovered, he didn't want those given to him automatically. He only wanted to learn them through toil.

Even HaEzer: Using Facial Recognition Software to Determine Jewish Lineage

Cynthia Robertson is dating Michael. As the relationship started to get serious, Michael informed her that he comes from a traditional Jewish family and that his parents would never allow him to marry her because she is not Jewish. On a whim, Cynthia did a DNA genealogy test with 23andMe, and the results came back that she has Eastern European Jewish ancestors. She approached her mother Mary Anne about this, who revealed that Mary Anne was adopted when she was born in 1961. She knows nothing about her biological parents and the only document she has is a picture of her biological mother holding her at the time of birth.

Artificial intelligence-powered facial recognition is emerging as a promising advancement in the field of genealogy. Computer-based facial recognition is a form of AI that uses various data points on a person's face and compares them to a database of other photos. This might include proportional distance between eyes and nose and unique facial features. Anyone who uses Google Photos knows that these systems are able to associate a person's photo as an infant with an adult photo. In the last few years, genealogists have been able to discover family connections by searching through photo databases. The website numberstonames.org enables users to upload a photo and then search Holocaust databases to identify potential matches in pre-Holocaust or Holocaust-era photos.

Cynthia uploaded the aforementioned photo to the site and found a match with a high degree of accuracy. Her biological maternal grandmother matched with a four-year-old girl in a family photo taken in 1938 in Warsaw. The photo has many clear identifying features indicating that this is a Jewish family, including the last name: Goldstein.

Does that mean that Cynthia is Jewish? Would an Orthodox rabbi officiate at a wedding if Michael and Cynthia decide to get married? While there may not be any halachic literature dealing with this question, the literature about determining Jewishness spans many centuries, including other recent contemporary issues.[7] There are two main factors that are relevant to this question. First, Tosafos in *Yevamos* 47a, s.v. *B'Muchzak*, note that *rov*, statistical majorities, play a role in determining Jewishness (see also Tosafos, *Pesachim*, 3b, s.v. *V'Ana*). We believe someone who claims to be Jewish because most people who make such a claim are indeed Jewish. In our case, can we assume that since there is a high percent chance that the person in the Warsaw photo matches Cynthia's biological maternal grandmother, that she is indeed Jewish? This assumption is difficult both on halachic and statistical grounds. From a halachic perspective, *Ba'er Heitev, Even HaEzer* 2:4, quotes from the *Teshuvos Beis Hillel* that if someone comes from another place and we don't know who they are, they need proof that they are Jewish, and this has been common practice in Lithuania. R. Yosef Shalom Elyashiv[8] ruled that Tosafos' allowance to follow *rov* only applies to individuals trying to determine if a person is Jewish for a specific purpose (e.g. making a *minyan* at the airport). However, if a beis din or another appointed official is asked to make a determination of Jewishness, one cannot simply rely on *rov* much in the same way that a kashrus organization cannot rely on *rov* to give certification to a restaurant. From a statistical perspective, if the photo match is, for example, 95% accurate, that means that there is 5% false positivity rate. Bayes' theorem emphasizes the importance of considering prior probabilities, meaning that alongside the discovery of the photo, the very low initial likelihood of Cynthia being Jewish must also be

factored into the analysis. This would make the actual statistical likelihood that Cynthia is Jewish a lot lower, and depending on the false positivity rate, the overall likelihood could be lower than 50%.

The second factor relevant to this discussion is the concept of *simanim*, indicators. *Simanim* are used to determine the identity of animal species (*Chullin* 79a) and for returning lost objects (*Bava Metzia* 27a). The concept of *simanim* also comes up in the Talmud in discussions about identifying a deceased individual so that his wife can remarry. The Mishna, *Yevamos* 120a, states that one cannot use *simanim* on his body to identify him. The Gemara comments that this seems to indicate that *simanim* are not a biblical concept. R. Shmuel Feivish, *Beis Shmuel* 17:70, explains that there are three levels of simanim. Features that are fairly common (*simanim geru'im*) don't count at all. Features that are highly unique to that individual (*siman muvhak b'yoser*) are comparable to recognizing the individual (*tevius ayin*) and are valid on a biblical level according to all opinions. The Gemara debates whether *simanim* (distinguishing features) are a biblical concept. This dispute specifically concerns unique identifiers that, while uncommon, could theoretically be shared by another individual. Facial recognition software operates on a similar principle, identifying and matching distinguishing features between photographs. However, it doesn't rise to the level of *siman muvhak b'yoser*, and in our case, there is certainly a possibility (even if it's small) that the person in the picture is someone else. At the same time, when a beis din or rabbi assesses someone's Jewish identity, they use certain indicators such as family names, family background (language, practices and culture) and documents, all of which don't prove definitively that someone is Jewish, but paint a broader picture that indicates someone is Jewish.

In our case, matching the pictures of Cynthia's grandmother may not be the last step of determining Jewishness, but a first step. If the facial recognition software is correct, Cynthia can use that information to track down other relatives. She may be able to establish a stronger connection to the family in the picture using DNA and she may even be able to find her biological grandmother, or a relative who could provide more concrete information.

Choshen Mishpat: Liability for Damage Caused by a Self-Driving Car

Autonomous vehicles, more commonly known as self-driving cars, may one day significantly improve road safety. The vehicles eliminate common human errors made while driving. However, these vehicles have had their share of accidents—some, the fault of another vehicle, and some the result of error, either by the operator ("driver") or the manufacturer.

In this survey, we will discuss one question: what is the nature of liability for an owner of a self-driving vehicle that caused an accident while operating autonomously? The Mishna in *Bava Kama* 26a is clear that damages caused by a person have a higher degree of liability than damage caused by one's property. A person is responsible for damages caused by his direct actions even if the damage was caused by circumstances beyond his control. If someone activates a self-driving vehicle and instructs it to drive from point A to point B, and in the process, the vehicle is involved in an accident, do we consider that an action caused by the operator or do we treat it like damage caused by his property?

If a person throws an object and causes damage, that is called *kocho* and we consider it as if it was caused personally. What if there is a chain reaction of events? Do we attribute all the events to the person who set the system in motion? The Gemara, *Sanhedrin* 77a, has a concept of *koach sheni* (secondary action) and says that this is *gerama* (indirect). R. Shlomo Zalman Auerbach, *Minchas Shlomo* 2:26, suggested that if a machine cycles on and off (by timer or thermostat), the second cycle is no longer attributable to the person who started the cycles. R. Avraham Yeshaya Karelitz, *Chazon Ish* O.C. 36:1, however, is of the opinion that if a system is meant to function by cycling on and off, all the cycles are attributed to the person who started the system. Nevertheless, we can't necessarily compare a chain reaction of events caused by a self-driving vehicle to a machine that cycles on and off. When a machine is set, the chain reaction of events is predictable and there are no external factors. A self-driving vehicle is constantly adjusting based on other drivers and road conditions.

If we don't consider an accident caused by a self-driving vehicle as damage

caused directly by personal involvement, the operator can be held liable for damage caused by his property. The opening Mishna of *Bava Kama* lists the various categories of damage caused by property. A self-driving vehicle may not fit neatly into a specific category. Nevertheless, the Gemara, *Bava Kama* 6a, discusses situations where the damage is categorized as a hybrid. For example, if a person leaves a package in the middle of the street, it is considered a *bor* (a pit, property that causes damage while stationary). If the package was left at the edge of the roof and the wind blew it elsewhere, it might be considered a hybrid of *bor* and *eish* (fire, or any damage caused with the assistance of the wind). The Gemara also discusses a package that was left in the public and causes damage as people and animals kick it around. In those cases, we must determine if the people or animals who kick the package are fully responsible or if they also share in responsibility. This model of joint responsibility is proposed by Rabbeinu Asher, *Bava Kama* 1:1 and codified in *Shulchan Aruch*, C.M. 411:3-6. These sources would be relevant when assessing who is responsible for a self-driving vehicle that was left to roam in public property and caused damage. Sometimes, one party would take full responsibility and sometimes there would be shared responsibility.

Conclusion

The examples listed here, while covering a range of topics, only scratch the surface of ethical and religious questions that might arise as society embraces artificial intelligence. As technology progresses, we should continue to use human intelligence to navigate how these technologies impact our lives.

Endnotes

1. See R. Zalman Nechemiah Goldberg's article in *Ateres Shlomo* Vol. VI, R. Tzvi Kushelevsky's article in *Ateres Shlomo* Vol. IX and R. Asher Weiss, *Teshuvos Minchas Asher* 1:32.

2. For a fuller treatment of *pesik reishei* and its applications to cameras and motion sensors, see my article "Halachic Issues Commonly Encountered During a Hotel Stay on Shabbat and Yom Tov," *Torah To-Go*, Sukkot 5771.

3. See R. Goldberg and R. Weiss ibid.

4. Rav Akiva Eger, *Derush V'Chidush, Shabbos* 154a, asks the following question: The Gemara, *Shabbos* 153b, states that if someone uses a voice command to cause an animal to perform *melacha* (such as *hotza'ah*, carrying a load into the public domain), it is violation of Shabbos (*mechamer*), but the severity of this prohibition is not the same as one who violates a *melacha* with his own body. If using a voice command to have two animals plow together is a direct violation, as if one performed the act with one's body, why isn't using a voice command to have an animal perform *melacha* a direct violation of Shabbos? R. Yechiel Michel Rabinowitz, *Afikei Yam* 2:4 (2) presents two answers to this question. First, in principle using one's voice is the equivalent of using one's body. *Mechamer* is an exception to the rule because the Torah specifically listed it as a separate and distinct prohibition (*lo sa'aseh kol melacha … uvehemtecha*) from the other *melachos* of Shabbos. Second, regarding leading an animal, the prohibition is against a person performing an act on an animal. In such a situation, it doesn't matter whether the act is performed with one's body or one's voice. Regarding *mechamer*, the prohibition is to cause the animal to perform a *melacha*. He may use his voice to get the animal to respond, but the *melacha* itself is performed by the animal. According to the first answer, using one's voice is the same as using any other part of one's body and there's no room to distinguish between passing a camera equipped with facial recognition and talking to someone knowing that the device will use voice recognition. The second answer suggests a potential difference between two scenarios: (1) issuing direct voice commands, which parallels commanding an animal since it involves intentional system engagement, and (2) having normal household conversations while being aware of ambient voice recognition systems. In the latter, talking, even though it is a *pesik reishei d'nicha lei* may be a lower-level prohibition than walking in front of a facial recognition camera. While still problematic, perhaps this might be a consideration in a case where someone forgot to disable the system before Shabbos.

5. A fuller discussion of these two aspects of *talmud Torah* can be found in my article "Torah Study: Results Are Also Important!" *Torah To-Go*, Shavuot 5771.

6. The question presumes that by receiving a brain implant with Torah data built into the chip, the information contained on that chip becomes part of one's knowledge base. One could argue that there is no difference between the information stored on a chip in the brain and the information stored on one's laptop or mobile device. The question of how much an implanted device becomes part of the body is a question that is very relevant to prosthetics and is beyond the scope of this presentation.

7. See my article "Use of Mitochondrial DNA to Determine Jewishness," *Yadrim* vol. 3, which draws on materials that appear in *Birurei Yahadus L'Or Mechkarim Genetiyim*, edited by R. Yisrael Barenbaum and R. Zev Litke. The work contains numerous chapters by the aforementioned editors as well as a responsum by R. David Lau and analysis by Prof. Avraham Steinberg. R. Asher Weiss also wrote on this topic in the journal *Orach Mishpat* Vol. I. *Teshuvos B'Mareh HaBazak* 9:30 also has a responsum on this topic.

8. Cited in R. Moshe Mordechai Farbstein, "*Yahadutam Shel HaOlim MiRussia*," *Techumin* Vol. 12.