

## Automobility, Autonomy, and Communication

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This article explores the tension between the freedom a self-driving car offers and privacy considerations. Studies of the automobile's impact on the environment, public health, noise, planning, and development, as well as its appearance in, and inspiration of, popular culture are easy to find. In the field of communication, research on cars as a medium or as a site of communication often falls into the domain of mobilities, as defined by John Urry (2007). Mobilities consider not just the travel of people and objects through space, but also the imaginative, virtual, and communicative travel of messages between people and things. Julia Hildebrand (2017) notes the relationship of mobilities to media ecology and argues that we can understand the exploration of converging media and mobility entities as transportation–information–communication technologies. Furthermore, imaginaries of the autonomous car promote greater freedom for drivers while raising concerns with the necessity of increased connectivity. The automobile is a case for concern in communication studies, particularly around *mobilities, privacy, autonomous vehicles, affordances* issues of control, freedom, and privacy.

*Keywords:*

The ubiquity of cars as sites of popular culture consumption among young people in the United States brings to mind Raymond Williams' (1974) notion of "mobile privatization." Cars are also noted as having a role in promoting privacy (Löfgren, 2014), in how they separate people from the public. This social role is also noted in Vincent's (2016) history of privacy, which describes how people are able to form intimate escapes from the public via the automobile. But critical insight about the environment within automobiles is necessary. We feel that the emergent discourse around autonomous vehicles signifies a shift in how we can think about the car as both a space and a participant with the driver or passengers in their travels. This is noted in the work of Beckmann (2009), who argues that in these intelligent transportation systems (ITSs), "technology has replaced human action and, thus, has blurred the distinctions between entities with and without agency" (p. 86). The hybridity between drivers and cars emerging from that relationship makes autonomy and independence "fictitious":

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While for the early 20th-century driver, the car—practically and symbolically—may have allowed for independence and personal freedom, the late 20th-century driver had to acknowledge the mixed blessings of automobility. The motile hybrid of the 21st century, however, has eliminated any sort of independence that may have been assigned to earlier stages of automobility—not even the ambiguities have survived the total merging of car and driver. Hybridization chains the driver to the car, it partially deprives the subject of its agency and hands it over to a so-called intelligent transport system. When the hybrid is around, independence is absent—it has been substituted by *isolation*. (Beckmann, 2009, p. 89)

The goal of this article is to re-examine Beckmann's position in light of the more recent popular discourse on self-driving cars. We are concerned with the implication of this hybridity for personal privacy and resistance to those systems. We also intend to connect mobilities research with broader conversations in communication theory and science and technology studies.

The self-driving car's (see Figure 1) disruptive economic potential is hotly debated in popular discourse (Fagnant & Kockelman, 2015), but its cultural consequences are less discussed and may prove to be as or more of a disruption of everyday life than of the economy of transportation. In the United States, the automobile is inextricably associated with freedom and independence. Ownership of a car is a mark of mobility, capital, and the means to travel on one's own time. The open road suggests a limitless expanse with endless opportunities. It also represents an entry into American culture as cars have been intensely significant social artifacts in the United States for nearly a century, serving as both cultural object and cultural conveyance. As Phil Patton (1986) puts it, "American highways are a national network, a mass medium. Driving . . . (is) a process not unlike watching television" (p. 21). Although Patton does not cite Raymond Williams (1974), it is interesting that both scholars make connections between watching the road and watching television, articulating the tensions that result among intertwined networks and modes of transportation and communication. Jonathan Sterne (2006), in an essay examining James Carey's (1999) fruitful distinction between transportation and communication, argues that the distinction need not be a separation, that movement and communication can be productively linked particularly in regard to sociality. For Sterne, such linking restores the connection between mind and body, between the symbolic and nonsymbolic dimensions of communication, and in so doing provides an opportunity to theorize the social and physical worlds together.



**Figure 1. Autonomous vehicle concept by Google.**

Such theoretical work is particularly necessary in regard to autonomous vehicles. Beneath the exterior of their literal and figurative designs and exuding from the automobile's materiality is a tension between privacy and sociality, constituted materially in relation to the imagined, engineered space of the automobile's cabin and the attendant technologies that mediate the interior space and its intersection with the exterior space through which the automobile moves. In this article, we argue that autonomous vehicles complicate the tensions already described by Williams in his discussion of mobile privatization. First, they connect cars to information and communication networks, forming the ITS and hybrid mobilities, as described by Urry (2009). Second, they alter agency and privacy within the space of the automobile's cabin. It is therefore important for communication scholars to explore, study, and theorize the automobile and its role in contemporary social formations.

### **Freedom and Control**

Freedom is usually the central rhetorical element in discussions about the automobile in the United States. For example, Forceville (2014) notes the way car commercials invite viewers to construe metaphors that go beyond the technical design features of a car (antilock brakes and such) toward "mappable connotations," such as strength, speed, safety, state-of-the-art design, and so on. They are often depicted traveling through rural scenery, contrasting their high-tech design with the pastoral ideal. "Nature-as-backdrop" both diminishes our perception of the environmental costs of the car and reinforces the anthropocentric or even narcissistic drive to enjoy one's self and "help the Jeep Wrangler reach the fishing hole" (Corbet, 2002, p. 150).

This contrast between the car and the country echoes Leo Marx's (2000) exploration of our contradictory desires for creature comforts and the bucolic. As James Carey (1999) puts it in an essay reflecting on Harold Innis and the intertwined notions of communication and community, "Americans are forever building

a 'city on a hill' and then promptly planning to get out of town to avoid the authority and constraint of their creations" (pp. 88–89). The car represents the power to escape on a moment's notice (see Figure 2). It is the machine that serves our need to escape to the garden. Marx writes that "a favorite strategy, validated by marketing research, assumes that Americans are most likely to buy the cigarettes, beer, and automobiles they can associate with a rustic setting" (p. 6). In a study of 263 car commercials on YouTube dated from 1960 to 2014, Beyer and Moyer (2014) noted that capability (defined as performance, power, speed, acceleration, and/or technology) was the feature most strongly pitched. Rural settings were present in 40% of all commercials studied. It should be no stretch to argue that the culture of the automobile is tied to a sense of escape, particularly from modern life and urban settings, and therefore is tied to a sense of freedom, with control (or at least capability) to initiate one's escape upon entering the automobile.



*Figure 2. Detail from a vintage Chrysler advertisement.*

Oswald (2014) provides a history of the creation of ITSs or smart transportation infrastructure. In this account, she notes that the contemporary "series system" of automobility can be understood as a nexus system, in which each part of the system must coordinate and work together. Autonomous mobility in a developed environment does not mean independently operating and disparate vehicles; rather, it is contingent on a host of smart infrastructure that can synchronize those in transit. This has a historical precedent in the operation of railways, which depended on synchronized timing, telegraph systems, and signals to coordinate mobility. But the notion of this coordination strikes against our sense of freedom and autonomy. As we build and become accustomed to ITSs, will we eventually want to escape from the car itself, just as we escape from the nexus system of the city for the bucolic countryside.

Freedom within the interior of the automobile has been contested in recent decades in the United States as laws and regulations promoting safety have sought to proscribe the behavior of occupants. Seat belt requirements and hands-free mobile phone use, for example, although mandatory under the law for years, are still seen by many as a nuisance if not an overstepping of bounds dictating individual behavior and encroaching

on drivers' and passengers' freedom. The prevalence of negative attitudes toward such laws is likely what has forestalled the implementation of technical systems that would disable a vehicle if a seat belt were not fastened or disable a mobile phone were it in hand. Tesla has developed and implemented in its cars a system that detects whether a driver's hands are on the steering wheel while the car is in autopilot mode and will not re-engage autopilot use for subsequent rides until some time has passed. But the implementation of this system is already drawing criticism from drivers who believe it is not fair and impinging on their ability to use the car as they wish. Lauier and Dant (2011) note the way that social interactions inside of cars are intertwined with the operation of the car itself and the journey of the passengers: With a driverless car, "tasks needed for moving without incident—driving and wayfinding—will disappear" (p. 237). The loss of little "pleasures of mastery" and what Lauier and Dant see as a "surrender of autonomy" lead to "a new mode of domestic habitation" (p. 240), similar to forms of mass transit but with an increased intimacy. We only need to extend their thinking to ask ourselves what people do on public transportation and what they might do with more personal space. This reveals the conflict between personal freedom during transit and our sense for propriety outside the home. If driverless cars would be more like mobile homes, this complicates the associations that Büscher, Coulton, Efstratiou, Gellersen, and Hemment (2011) reveal in the operation of ITSs.

What makes autonomous cars particularly interesting is their place in this intersection of freedom and control. They promise both freedom to escape and freedom from driving. They serve a futurist vision, "a smooth ride out of the turbulent world of today and into The World of Tomorrow's prophesied tranquility" (Curts, 2015, p. 739), a fantasy since the 1920s (Packer, 2008). Furthermore, they offer the potential for lessened anxiety by purportedly being able to perform better than human drivers and thus eliminate accidents. They are touted as a better machine, a better means of escape to the garden, giving freedom and mobility within man-made and natural spaces as well as freedom from worry and stress for the driver. Autonomous cars may also, however, simultaneously take control away from the driver, relegating the driver to the person who decides the destination but not the route, the destination but not the journey, eliminating Lauier and Dant's (2011) "pleasures of mastery" in the operation of the vehicle. Or, they may put the driver in control only when the technological system fails. Despite claims of hybridity, there is still the struggle for control.

These are but some of the tensions between autonomy for drivers and autonomous vehicles, between transportation as functional and transportation as ritual, between and among the intersections of machines and mobility, of freedom, control, and power. The development of autonomous vehicles is a paradigmatic shift away from a culture of driving, of control to one in which driving is managed by machines and in which control is required only in the most fraught instances. Should the machine lose control and relinquish it to the driver, as contemporary autonomous driving systems are designed to do, the question is not only whether the human will be ready to assert control, but whether there is developing a middle ground between driving and being driven, an always-ready-to-drive.

Furthermore, discourse around autonomy for the self-driving car suggests new agency for drivers, or perhaps a redistribution of agency away from driver attention to the exterior of the car to its interior, a redirecting of attention from that which is external to the vehicle to its internal space. If we imagine agency as a limited resource, adoption of autonomous cars involves a human sacrifice of this power, which is connected to values wrapped up in the mythology of car ownership and operation in the United States in particular. This agency is strongly tied to a sense of autonomy and security drivers feel as owner/operator of their car. The "black-boxing"

of control and maintenance of the vehicle put onus on the driver only in the worst situations, when risk and liability are greatest.

### Privacy and Freedom

The sense of freedom connected to mobility is tied to the development of the definition of privacy in the United States. Warren and Brandeis' (1890) conception of "the right to be let alone" recognize that the scope of legal rights with regard to privacy expands to a spatial dimension, a distinction between private and public that exists not only in the realm of utterances, of communication, but also exists in the realm of property, of space, as in the distinction between public and private spaces (e.g., "domestic life" and "domestic circle," as used by Warren and Brandeis). A right to liberty came to mean that the law secured extensive civil privileges. More than just a "freedom from actual restraint," the right to privacy protects the personal from the scrutiny of the public. In this sense, it is a "freedom from," or a negative liberty, in Berlin's (1969/2002) terms. The car itself provides the "freedom to" travel, or the positive liberty of transportation, capacity for escape (see Figure 3).



**Figure 3. Vintage Jeep advertisement.**

Our right to privacy in this sense reflects the car as a personal domain, a place where we can resist search or seizure. The motor vehicle exception to the United States 4th Amendment allows for the police to search automobiles without a warrant in the event they have probable cause to do so. This is complicated by the fact that a search of an autonomous car may involve more than the physical contents, but its data and digital records as well (Barrett, 2017). With existence of personal assistant software such as Amazon's Alexa and Google's Home, which are always listening (Moynihan, 2016), the amount of privacy we can expect for any data stored by a car is legitimately worth thinking about. Conversations, location data, and listening habits are all potentially part of the automobile's purview, and we can expect autonomous cars to record and store a good deal of data as they need to sense and react to their environment.

However, Solove (2008) critiques the idea of a universal sense of privacy, arguing instead for pluralistic values: Privacy affords various values in different forms, toward different ends. It has no sole essence; instead, privacy poses different problems dependent on context. Solove's taxonomy includes information collection, processing, dissemination, and invasion. This is worth noting when we think about how invasions of privacy actually occur: Solove's examples include drug testing of middle school students, data mining through personal information databases, and the broader dissemination of semipublic records, which all pose different issues to different parties. With autonomous cars, we have already suggested that probable cause may give authorities access to personal data, not to mention breaches in security via attacks and theft. In another imaginary scenario, if cars keep a record of the driver's whereabouts and someone else (a family member, an insurer, an employer) decides the driver is going places they disprove of (a boyfriend's, a liquor store, a protest), is the driver's eventual frustration directed toward themselves or the car for spilling the beans? Self-driving cars are no more independent than us humans. They have their own "entanglements" with other things and people (Hodder, 2014). This ensures that complex privacy concerns will arise that clash with the rhetoric of automotive freedom. These are noted by Büscher et al. (2011), who describe how using an autonomous vehicle with all its entanglements is similar to enacting a form of citizenship. ITSs and smart mobilities both necessitate forms of surveillance to maintain order but in a way that may be easily abused. The value of location data cannot be understated, both in terms of how efficiency in ITSs can be optimized, but also because they can be monetized and used by car manufacturers, mapping systems, and potentially third parties. Presently, my Google Maps app on my iPhone will sometimes tell me directions using what it deems as popular landmarks, such as a Subway restaurant. If our car knows what we like, it would be foolish for others not to try to guide our paths with the hopes that we make profitable detours.

Autonomous cars will be connected cars, dependent on traffic infrastructures, GPS, remote controllers, and so on (Dokic, Müller, & Meyer, 2015). In the framework of actor-network theory, they have deep and strong ties to other actants. These are things that are not "autonomous centers of value" (Shaviro, 2015, p. 22) or withdrawn in their being (Harman, 2002), but they are enchained in relations (Hodder, 2014, p. 22) with actors and systems beyond the body of the car, largely invisible to the user. Tesla, for example, records and collects the autopilot data from all cars on the road. Tesla notes in its privacy policy that it remotely collects the following:

Certain telematics data regarding the performance, usage, operation, and condition of your Tesla vehicle, including the following: vehicle identification number, speed information, odometer readings, battery use management information, battery charging history, electrical system functions, software version information, infotainment system data, safety-related data (including information regarding the vehicle's SRS systems, brakes, security, e-brake), and other data . . . data about accidents involving your Tesla vehicle (such as air bag deployment) and the following types of data: data about remote services (such as remote lock/unlock, start/stop charge, and honk-the-horn commands); a data report to confirm that your vehicle is online together with information about the current software version and certain telematics data; data about any issues that could materially impair operation of your vehicle; data about any safety-critical issues; and data about each software and firmware update. (Tesla, n.d., paras. 16–18)

The alternative use of such data from what was prescribed in privacy policies is a concern for the public. The National Highway Traffic Safety Administration instituted a mandate to install event data recorders (or black boxes, similar to a flight recorder) that could provide relevant data to responders in the event of a crash (Canis & Peterman, 2014). In 2013, the Electronic Frontier Foundation, Electronic Privacy Information Center, and the American Civil Liberties Union asked the National Highway Traffic Safety Administration to reconsider that rule, citing their concern over the ability to market valuable data from drivers. Auto industry representatives indicated that such data were already being collected. Google, which had previously lobbied to remove privacy regulation from California legislation on driverless cars, declined to comment on the issue (Koebler, 2014).

Coverage in popular media over data collection in autonomous cars ranges from concern to enthusiasm. Whereas Koebler (2014) records the concerns noted above, Fehrenbacher (2015), writing in *Fortune*, presents a markedly more enthusiastic perspective. Fehrenbacher writes that data collection allows for autonomous car manufacturers to improve their product. Hill (2013), writing in *Forbes*, reflects on a disagreement between Tesla and *The New York Times* (Broder, 2013) over conflicting accounts of a test drive by a journalist. The secret monitoring of the drive soured the enthusiasm of all involved (Sullivan, 2013).

The “freedom to” enjoy the capabilities of a “smart,” autonomous car means that engineers must design more “freedom into” vehicles, the way Kelty (2014) speculates. The additional imagined affordances (Nagy & Neff, 2015) provide a greater sense of what is possible, in contrast to older models of cars with fewer features. The conflict between a connective car with greater affordances (such as autonomy) and how that conflicts with our sense of freedom and privacy is noted in *Forbes* by Abuelsamid (2015). Additional social mobility and decreasing congestion and energy consumption come at the cost of anonymity. Whether or not that is important comes from how we value control.

### **Privacy and Control**

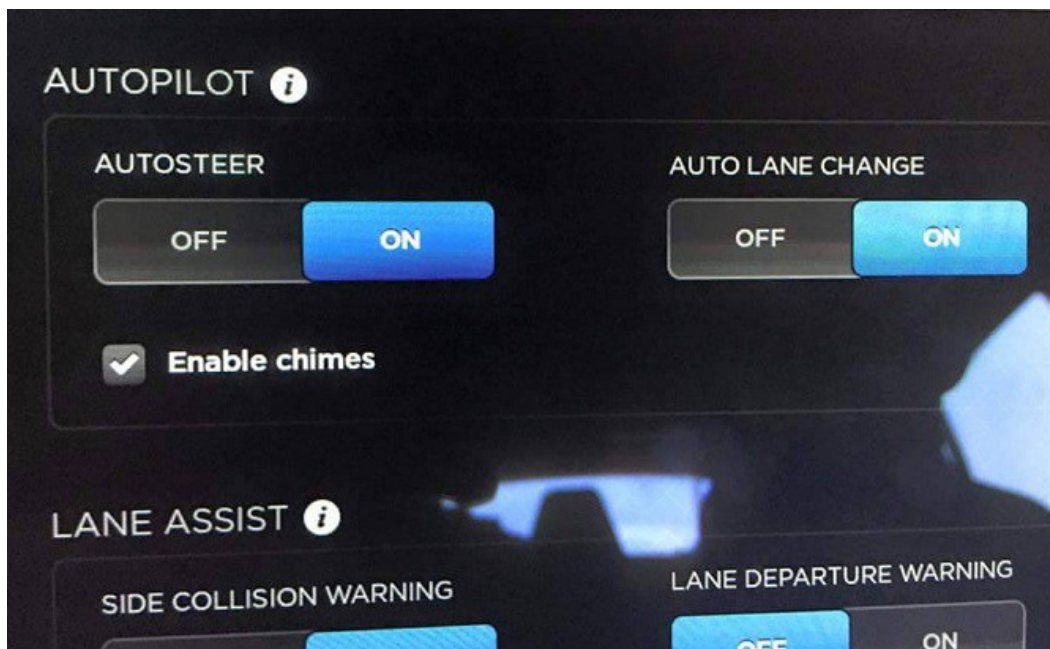
The distinction between positive/negative freedom is noted in a modern context by Kelty (2014), who asks how scholarship in media and communication studies and science and technology studies can view the way freedom is designed into things. If we take the idea of affordances (Nagy & Neff, 2015) to describe what potential uses are possible in a design, then we see how cars carry what Latour (1992) describes as a “moral and ethical



dimension" (p. 157), or prescriptions. These are designed into the artifact as freedom, control, whatever intended uses seen fit by the architect.

These designs are "embedded prescriptions," which help to dictate the proper use of an artifact. For instance, an ignition interlock device prevents someone from starting a car without using an attached Breathalyzer. If the user's blood alcohol count is under the ignition interlock device's preset, then the car will start. Likewise, a governor will regulate the speed of a car to satisfy design limitations or statutory requirements. The design of automobiles includes various examples of positive and negative liberty. Violating those prescriptions would be a form of proscribed or forbidden use. These are the political dimensions of artifacts (Winner, 1983). Control curtails freedom, with various justifications. Control can also cede freedom from certain actants to others.

Tesla's autopilot features work to "reduce the driver's workload," in the company's words (Tesla Press Information). Some of the components include an adaptive cruise control and "autosteer," which keeps the car moving with traffic and in the current lane when it is engaged (see Figure 4). It can also change lanes when the turn signals are used and automatically parallel park when the sensors detect an appropriate space. During these maneuvers, the car is working to avoid collisions. Tesla's press kit instructs drivers to keep their hands on the steering wheel at all times, even when the autopilot is engaged. The novelty of these "autopilot doohickeys" satiates the enthusiasm of automotive media and eager consumers (Blanco, 2014). These features reflect a semiautonomous degree of freedom/control designed into the artifact. Using it evokes curiosity and confusion, but increasing familiarity, leading to the urge to push boundaries.



**Figure 4. Detail of Tesla autopilot interface.**

The functionality of the car's sensors and controllers are determined by software, which is upgraded to reflect Tesla's prescriptions. There is a conflict between how drivers choose to use that functionality and Tesla's intentions, which results in new firmware versions designed with specific limitations.

The conflict between how a thing is intended to be used versus how it is "abused" or misused by drivers not following those prescriptions further complicates the design of control or freedom onto the autonomous car. The Tesla car's current inability to anticipate turns at high speeds by aiming for a geometric center of the turn (it is designed to strictly follow lane lines) means that autopilot at speeds over 90 mph would force the car off the road without supervision (Davies, 2015). This limitation means that drivers can cede only as much control as the car and its systems can handle: Without a more comprehensive set of dependences beyond the driver, the autonomous car is as independent as a driver at nighttime with no headlights or a car on cruise control and no hands on the wheel.

Cruise control itself dates back to the late 1940s (Teetor, 1950), and these systems were advertised as an "autopilot." They were first installed on 1958 Chryslers and Imperials and were described as a way control one's speed and save on gas. The driver sets the speed, but the vehicle maintains it. In this sense, control is still a relationship between what the driver assigns to the car (the set speed, which lane to drive a Tesla in) and what affordances the car grants the driver (via ignition interlock devices, governors, possession of the correct key to start the car, etc.).

An alternative to the seemingly independent autonomous car is Coelingh and Solyom's (2012) "robotic train" concept. This also shows the way that autonomy is less of designing freedom than it is absolving one sort of control for another. Drivers are free to let the car do the driving when they relinquish command to a lead car in a platoon. Cars communicate down a chain of following vehicles to anticipate turning, braking, and acceleration, using cruise control systems linked with the vehicles in front of them.

Control is designed as a negotiation among designer, artifact, and driver, as intentions and the subversion of those prescriptions are wrestled out. We have a sense of power and control in traditional cars, manifesting in dysfunctional episodes of road rage and idealized in the precision of professional drivers. For a mass market, control must be negotiated between the intentions of designers and the willingness of drivers to accept those prescriptions. The final design is a set of limited affordances.

Window tint, for example, cannot be adjusted, has specific affordances, and is subject to various legal and cultural frameworks. Too much tint may violate prescriptions; too little may frustrate our desires. Privacy is not just an issue of whether or not one has enough tint to be unseen in the backseat, but that our decisions and use of such artifacts are not subject to the scrutiny of others. Given the autonomous car's connectivity and dependency on external actants or resources, we can expect a large degree of influence on our use of the car from outside systems and interests.

### Resistances

By exploring the concepts of freedom and control, we see how privacy is not just a matter of the "right to be left alone," but is also integral to the sense of independence and the ability to use artifacts (in this case, to drive cars) without the sense that others are impinging on our use. In other words, the interests of others are not complicating our expected relationship with the artifact.

The automobile won its place in the rural imaginary and in the American consciousness about freedom from a long period of diffusion and acclimation. Kline and Pinch (1996) note how between 1900 and 1915, early cars threatened the rural social structures established by the horse and buggy. The noise frightened horses and made roads untraversable, and the car raised the possibility of people traveling farther away and becoming detached from their small communities. Resistance to the car came in the form of farmers destroying the very roads they had created, attacking drivers and attempting to damage or destroy cars. This changed with improvements to design that met the needs of farmers and enlarged the "interpretive flexibility" (in the language of social construction of technology) of the automobile. More freedom for people to use the car as they saw fit (as stationary generators, work vehicle, or recreational transport) led to a greater sense of empowerment and the view that the advantages of the automobile were irresistible. By the time the manufacturers responded to and closed this open-ended design, the car had already become a ubiquitous feature of the rural landscape: As early as 1920, farm households outnumbered nonfarm households in car ownership.

Privacy is strongly related to security, and from a design perspective, security could be seen as safety, guaranteeing and protecting the role of the designer in creating those embedded prescriptions. Tesla's firmware updates that limit autopilot functionality were rolled out as a safety measure. Needless to say, it is in Tesla's best interests that people do not crash their vehicles by using them in a way that Tesla does not intend for them to be used. But as we depend more on sophisticated technologies and have less literacy and expertise for determining our relationship with those things, we depend more on the engineer's prescription. The threat of an "overengineered" world means that technics become determined by technocratic interests, rather than the "society in the making" of socially constructed technological systems (Callon, 1987). Those with the power to bring a design to market can exclude other voices in the "actor-world" (Callon, 1986) of a thing, the space that drives the technological imperative of all networked actants and resources. The bleakest scenario is that we are left with cars that do things we do not want, yet do not recognize, thanks to our "technological somnambulism" (Winner, 1983) and the elimination of alternatives.

The argument that we can vote with dollars both accepts the premise of market logic and ignores the struggle over rhetorical closure (Bijker, Hughes, & Pinch, 1987) in design. Norton (2008, p. 5) describes the social construction of streets and the closure of such discourses. In the 1920s, U.S. society determined (thanks overwhelmingly to the interests of the automobile industry) that streets were a place for a specific sort of traffic, namely cars. "Safety" (or security) in the street was a source of conflict between disparate actors, including pedestrians and people on bikes. But the closure of that space reflected a very specific set of interests, pitted against what we now understand as "jaywalkers" (see Figure 5).



**Figure 5. "Mister Walker," character from *Motor Mania* (1950), a short by Walt Disney Productions on motorists and pedestrians.**

This created a landscape of very prescriptive uses and a sense of what we expect of our things and each other. This extends to all actants, whether or not they opt in or out of the network. If I am a nonuser of a car, I must still cross the road. If I do not want to be hit, I must obey the designed prescriptions of crosswalks. Other societies may have different customs in the way one crosses the street and who gains the right of way, but the absoluteness of such relations buries alternatives and any sense that we are "sleepwalking" through those technologies (Winner, 1983). People who are not behaving sensibly are insensible, incomprehensibly belligerent to the existing order, like image of a person walking on top of automobiles through traffic.

### **Conclusion**

With this in mind, studying the attitudes of drivers before they are influenced by designers would be prudent. History neglected by scholars is written instead by industry, with its own goals and aims, and directed toward the enthusiast (Flink, 1975, p. 3). Although there are social histories of the car (Berger, 2001; Packer, 2008) and reflections on their impact to literature and culture (Casey, 1997; Dettlebach, 1976), these are retrospectives and do not reflect the value of a "baseline" study before closure sets in. This is why it is important to study technology as it comes on our horizon, rather than when it looms directly in our faces. As these systems are projected to grow (Greenough, 2015; Hawes, 2015; Lee, 2016), it is best to study them and our reactions to them today rather than after standardization has set in.

For communication and mobilities scholars, it is important to understand the relationships of power and autonomy between the car and driver in the United States, and it is necessary to consider the context of the automobile as a medium and space of communication. Concerning the former, the automobile as a medium of communication, Ratan and Tsai (2014) identify "three fundamental types of communication that occur currently on the road" (p. 112). The first is communication between drivers and others around and near the car, such as when using a turn signal; the second is communication between the driver and car, such as when steering or otherwise controlling the vehicle; and the third is communication between the driver and others to signal an identity by means of vehicle customization.

Ratan and Tsai's (2014) focus is on the external dimensions of automobile communication, on interactions between driver and vehicle and between driver and others on the road, on the nature of the automobile as a medium of communication. But although automobiles are vehicles for transportation, they are also spaces of communication. There are three fundamental types of communication that occur within the automobile: communication between the driver and automobile, communication with the world outside, and communication between occupants. Whereas the first two have been less private over time, as the equivalent of airplane "black boxes" have come to be available in cars (in some cases, with the encouragement and financial incentive of insurance companies) and mobile phone records are investigated in cases of accidents, there is still a presumed privacy of communication among occupants within an automobile. But contemporary automobiles are becoming less private spaces in this regard, too, as items such as Bluetooth microphones and passenger sensors show up in new cars. Hackers are able to compromise systems of communication (e.g., eavesdropping; using GPS signals to misdirect, create sounds and noise to distract, interfere with driver warning systems).

Our focus in this article is on whether and how, when automobiles are autonomous, or even semiautonomous, interaction within the vehicle cabin might change and the cultural consequences of such change. From a functional standpoint, there will be, for instance, a need to learn about the thresholds for driver and passenger attention in autonomous vehicles and the development of robust communication systems that can effectively insert themselves into existing communication patterns in a car, overriding conversation or entertainment in a timely manner. Gish, Grenier, Vrkljan, and van Miltenburg (2017), in a study of older drivers' use of advanced vehicle technologies, found that "embedding [advanced vehicle technologies] into the vehicle can threaten the displacement of experiential knowledge, bodily gestures, and habits characteristic of driving, thereby generating disquieting corporeal experiences" (p. 249). In their research, most of the "disquieting corporeal experiences" were related to audiovisual modes of communication the vehicles used in an effort to impart information to the driver.

Automobiles were among the first technologies to speak directly to users, although not for long as they became the butt of jokes in the 1980s when an audible alert system would say, "The door is ajar" if a door was open or not properly closed. Whereas we are slowly becoming accustomed to hearing digital intelligent agents such as Siri and Alexa speak to us, automobiles still use exclusively nonverbal sounds to communicate with drivers, such as beeps and buzzes. In modern cars, will drivers and passengers listen? Will they hear? Will they be annoyed as people were in the 1980s? Furthermore, might audible alert systems be hacked and hijacked? Gish et al. (2017) note that "driving has become a digitally mediated activity with ever-increasing information about the driving situation communication by way of a third-party 'actor'" (p.

246). The symbolic relationship many people have with vehicles they own may become less symbolic and more symbiotic, mirroring the relationships that seem to be developing between humans and machines (Guzman, 2017; Jones, 2015). Molina-Markham, van Over, Lie, and Carbaugh (2016) and Carbaugh, Winter, van Over, Molina-Markham, and Lie (2013) are engaging in seminal work in this area in relation to understanding developing norms for communication with automobile systems.

Autonomous vehicles will change what cars represent, both in regard to their nature as machines controlled by humans and their function as screens, as enclosed, private spaces in a world demarcated by the car's framing the world in its windows. Perhaps we are in a transition from cars as driving machines to cars as machines that drive, a transition from human agency to machine agency, and thus an alteration of the symbolic relationship, the entanglement, between humans and automobiles that reconfigures and recalibrates the balance of trust and power between human and machine.

Our entanglement with automobiles will only be further entrenched as we trust them not only to take us where we want to go, but to keep safe our data, our personal lives, and our bodies as we see more control given over to the car in the future. With GPS services, we see the car and driver as not just the object of my communication ("Take me home") but a respondent ("Your destination is on the right"). If I let it drive off with others, will it tell me that everything is OK? It takes a good deal of trust to allow someone to drive your family somewhere. If that someone is my car, I must trust it before I will let it go anywhere without me. Perhaps the car can take itself to the mechanic. But can it take my children to school? This is an entanglement or a dependence that complicates our traditional notions of subjectivity and subject-object relationships, and it is not merely or purely a functional one, but rather one that is constructed over time, through communication and experience, as trust develops in a relationship.

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