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# When Automobiles Are Avacars: A Self-Other-Utility Approach to Cars and Avatars

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This article argues that automobiles can be understood as avatars, or avacars, given the inclusive definition of avatars as mediated (not necessarily digital) representations of human users that facilitate interaction with other users, entities, or environments. Building on an understanding of user-avatar relationships, the article argues that automobiles (and avatars in general) serve as self-representations, social others, and/or utilitarian tools in different degrees. Examples of automotive and digital avatars are classified within this Self-Other-Utility (SOU) framework. The article argues that this framework provides a new and valuable approach to understanding the antecedents and consequences of using avatars. Regarding consequences, in the automotive context, the SOU framework could be used to explain how psychological and social factors influence driving habits (i.e., safety), adoption (e.g., of autonomous vehicles), and brand loyalty. A measurement scale to facilitate such research is offered. After presenting some potential limitations to this approach, the article concludes with counterarguments that reaffirm the value and relevance of this new perspective to communication scholarship.

*Keywords: automobiles, avatars, avacars, communication technology, Self-Other-Utility framework*

Just as digital media technologies have been converging in content and functionality (Jenkins, 2004), digital communication technologies such as the mobile Internet are being increasingly integrated into automobiles (Goggin, 2012). This assemblage of automotive and communication technologies complement the mobile self and facilitate new modes of communication among automobile users (Hay & Packer, 2003; Juhlin, 2011). Further, automated driving technologies increasingly facilitate safe media use by the driver (Miller et al., 2015; Neubauer, Matthews, & Saxby, 2014). Simultaneously, the need for car ownership is decreasing (Kuhnimhof, Wirtz, & Manz, 2012; Kuhnimhof, Zumkeller, & Chlond, 2013; McDonald, 2015), signaling a larger shift in transportation technology use across our society (Lyons, 2014;

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van Wee, 2015). Combined, these shifts in the automotive landscape offer a novel and potentially fruitful context within which to study communication phenomena.

However, the automobile has been a medium of communication since its invention over a century ago, where communication is understood to be the sending and/or receiving of information either intentionally or unintentionally through some channel (Chandler, 1994; Gerbner, 1966; cf. Lang, 2014). The automobile serves as such a channel through which information is shared. Just as individuals cannot *not* communicate (Watzlawick, Beavin, & Jackson, 1967), the most basic facets of a car (e.g., make, model, year, condition) communicate information, intentionally or unintentionally, about the driver (e.g., wealth or style). Automobile designers utilize different components to convey emotion and identity of the car, such as friendliness and aggressiveness, through headlamps and radiator grills (Liem, Abidin, & Warell, 2009; Ranscombe, Hicks, Mullineux, & Singh, 2012). Drivers also deliberately communicate through automotive technologies, such as turn signals, horns, and even steering wheels, as well as through external adornments, such as bumper stickers and customized license plates (Ratan & Tsai, 2014). Although the extent to which automobiles are used and perceived as communication media depends on individual preferences and levels of experience, any communication medium is limited in a similar regard (Carlson & Zmud, 1999). Thus, this article accepts as a general premise that automobiles are communication media that carry and represent information about the user. Building on this premise, the article suggests that an automobile may serve as an avatar, or a "representation of a human user that facilitates interaction with other users, entities, or the environment" (Nowak & Fox, 2018, p. 34).

## An Inclusive Conception of Avatars

The term *avatar* has been used in many disparate ways within the field of communication, sometimes hindering consistency and clarity when comparing studies and findings. Addressing this issue, Nowak and Fox (2018) recently conducted a thorough review of computer-mediated communication literature and derived a useful definition that is inclusive of approaches from previous research and offers a common thread for future research. Namely, they define an avatar as a "digital representation of a human user that facilitates interaction with other users, entities, or the environment" (Nowak & Fox, 2018, p. 34). This definition offers valuable limitations on the term's use (e.g., avatars must represent human users) as well as helpful inclusions (e.g., avatars cross modalities and levels of realism and anthropomorphism). However, we do not accept the claim that avatars must be digital entities.

Nowak and Fox's article (2018) centers on computer-mediated communication (i.e., interactions in digital environments), but they do not provide a strong theoretical justification for restricting their definition of avatars to digital entities. They state that their definition "is limited to digital representations, which excludes physical entities such as game pieces, sock puppets, or robots" (Nowak & Fox, 2018, p. 35), without supportive reasoning. Such reasoning can be inferred to some extent—game pieces and sock puppets are less versatile and malleable than digital representations, and thus are limited in their ability to represent humans on many levels.

However, from the inception of the concept, avatars have taken many nondigital forms, including humans themselves. Specifically, the term *avatar* comes from the ancient Sanskrit avatarah, meaning

the earthly manifestation (usually human or other animal) into which a Hindu deity has descended in order to interact on Earth (Bailenson & Blascovich, 2004; Bowman, Banks, & Downs, 2015; Sheth, 2002). Needless to say, these were purely nondigital avatars. Although Western popular media adopted the term to refer to digital representations of humans, such as in video games (e.g., *Ultima IV: Quest of the Avatar*, 1985) and virtual worlds (cf. *Snow Crash*, 1992 novel), nondigital human representations have also been referred to as avatars in recent popular media. For example, in the television series *Avatar: The Last Airbender* (2005–2008), "the Avatar" is a humanlike manifestation of a godlike spirit who helps maintain social balance on Earth. Further, the science-fiction film *Avatar* (2009) depicts a young man who uses a synthetic blue alien body as an avatar, embodying it and eventually identifying with it more than he does with his own body. These examples illustrate that from its inception through recent uses, the term *avatar* refers to both digital and nondigital (e.g., organic) representations of human users.

In the context of current technological capabilities (not sci-fi), there are many nondigital entities that serve as avatars. For example, modern robots and automobiles are assemblages of both mechanical and digital components that rely on the same type of high-speed computational processing that allows digital avatars (e.g., video game characters) to function. The act of operating a robot or automobile involves similar (if not identical) types of controller units that can be used to operate digital avatars. Regardless of the specific user interface (e.g., buttons, wheels, joystick), such a controller communicates information about how the robot or automobile should behave. For robots and many modern vehicles, this operational process is entirely digital—the controller sends digital signals to the computational unit controlling the robot or automobile, sometimes called drive-by-wire systems (Bertoluzzo et al., 2004). Thus, for the user, the experience of controlling a robot or automobile could be identical to controlling a digital avatar.

While researchers in more computationally oriented fields have used the term *avatar* to describe user-controlled physical robots (Aymerich-Franch, Petit, Ganesh, & Kheddar, 2015; Bremner, Celiktutan, & Gunes, 2016; Bremner & Leonards, 2016; Maeyama, Yuta, & Harada, 2001; Rich & Sidner, 2009), the field of communication has not traditionally examined these technologies. As argued earlier with respect to automobiles, the increasing integration of digital communication media into automobiles signals a great potential for scholars to study communication phenomena within this context of tangible media. Thus, while Nowak and Fox's (2018) review of avatar literature in the field of communication identified mostly (if not fully) digital examples, we see strong cause for the field to consider nondigital avatars as well.

We should also note that Nowak and Fox (2018) do not claim that all avatar research should utilize the definition they offer, but instead that researchers should carefully explicate how they are conceptualizing and operationalizing the term. Following this suggestion and acknowledging that Nowak and Fox's definition is useful for encouraging clarity in the field, we adopt but slightly widen their definition, removing the requirement that avatars be digital. Instead, we argue that as representations of users—and not the users themselves—avatars exist through media (i.e., any digital or nondigital means of communicating information). Hence, we define avatars as mediated representations of human users that facilitate interaction with other users, entities, or environments.

**Cars as Avatars: Avacars**

Building on this definition of avatars, the argument that cars may serve as avatars (i.e., avacars) is straightforward. Cars represent their human users. When you see a car on the road, you know there is likely a human user in control of it and you can infer information about that user based on your observations of the car. The user is mediated through the car—or the many components that comprise the car, such as metal, paint, glass, lights, rubber, electronics, computations devices, and other technologies. The car facilitates interactions with other users (e.g., drivers, pedestrians), entities (e.g., traffic lights), or environments (e.g., vacation destinations). Hence, each element of the definition of avatars—user representations, mediation, and facilitated interaction—is applicable to cars.

Although this comparison of automobiles to avatars is relatively novel, previous observations about the ways that people relate to their cars are consistent with this notion. Cars can be evocative objects (Turkle, 2007) that carry strong emotional associations that ground everyday experience. People often choose elements of the car's external and internal appearance to reflect elements of their own identities (Dant, 2004), from socioeconomic status to political and cultural attitudes (Sheller, 2004). This could be manifested through decorations, such as customized license plates or bumper stickers, which often intentionally communicate social identity (Endersby & Towle, 1996; Newhagen & Ancell, 1995), to less overt signals of the user's identity, such as the car's brand, size, or color (Ratan & Tsai, 2014). Further, the car's movements and other behaviors on the road (e.g., turning, direction signaling, horn sounding) communicate information about the user's behavioral intent (Ratan & Tsai, 2014).

These points clearly suggest that the definition of avatars can be practically applied to cars, but there are also potential moderators of this application based on technological characteristics and individual differences. Regarding the former, as cars increasingly include automated driving technologies, such as adaptive cruise control and lane keeping, the user's role in controlling the car's behavior—and thus communicating information about the user's states and intent–will decrease. A fully automated vehicle that prevents the user from directly intervening in driving actions would limit the extent to which users are able to interact with others, entities, or the environment through the car, thereby hindering the ability to consider it an avatar.

Further, even for traditional cars that are driven by human users, individuals differ in the extent to which they perceive cars as representations of themselves. For example, while some people see their car as a vehicle for expressing identity—perhaps through hood ornaments and fuzzy dice hanging from the rearview mirror—others think of the car as more of a social other (e.g., a friend), while others simply see it as an object, a tool for transportation (Ratan & Tsai, 2014). This notion aligns well with previous research on perceptions of avatars. Specifically, the player-avatar relationships (PAR) typology—developed by Banks (2015) through a deep contextual understanding of avatar users in online games—suggests that different people perceive the same type of avatar (e.g., characters in the online game *World of Warcraft*) in different ways. Some people see the avatar as we have defined avatars here—a mediated representation of the self—and this is associated with a high level of identification with the avatar. Some people see the avatar as a social other, representing identity attributes that do not belong to the user (e.g., a character with a pre-existing backstory, such as Laura Croft), but still a social entity with which the user may identify. Some

people see the avatar simply as a tool, an object that facilitates the pursuit of goals and thereby provides utility but little identification. In sum, an avatar may serve as a representation of self, a social other, and/or a utilitarian tool.

These three avatar-perception categories provide an important foundation for the theoretical development offered in this article. It is important to note that these categories are conceptualized to be non–mutually exclusive. By the avatar definition adopted here, avatars facilitate interaction, and thus they serve a utilitarian function even if they represent the self or a social other. Further, avatars represent human users by definition and thereby communicate at least minimal information about the user, even if they also represent a social other or serve utilitarian functions. Finally, an avatar is a mediated object—not the user herself—and so the avatar can be interpreted as an "other" even if it looks like the user and is mostly controlled by the user. This argument is akin to Peng's (2008) assertion based on social cognitive theory (Bandura, 1989) that avatar use can be considered a mediated enactive experience. In other words, avatar use is enactive (i.e., the user acts/interacts through the avatar), but it is also observational (i.e., the user sees the avatar as separate from the self). In sum, an avatar may serve as a representation of self, a social other, and/or a utilitarian tool in differing degrees.

To illustrate our conception of how these avatar-perception categories are not mutually exclusive, we offer a Venn diagram of the classification of an avatar within these categories (Figure 1). This framework can be applied to any type of avatar, though we will focus on application to cars. We should note that although the diagram is anchored by the three categories discussed (self-representation, social other, and utility), given the preceding logic, we assert that any entity that qualifies as an avatar (according to the definition adopted here) can at least in small part be classified into all three of these categories. Thus, the anchors are meant to illustrate that an avatar can fall mostly into the given category, but not completely.

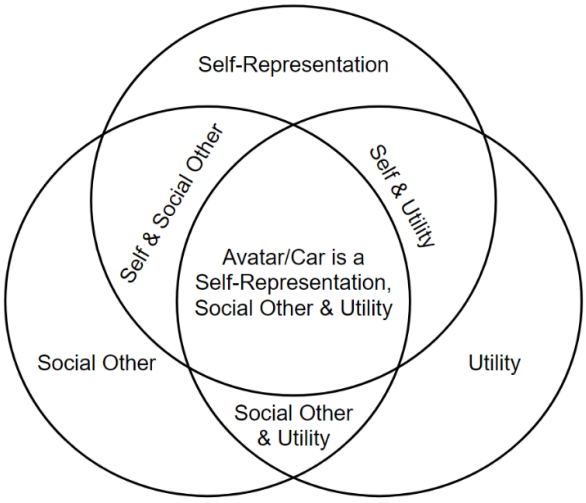


***Figure 1. Venn diagram of avatars (or cars) as self-representations, social others, and/or utilities.***

## Classifications Within the Self-Other-Utility Framework

The Self-Other-Utility (SOU) framework offered here facilitates a comparison of the ways automobiles serve as different types of avatars. Considering both technological affordances and individual preferences, we explain and provide examples of how different automobile perceptions fit within the framework, as well as brief examples of corollary digital avatars.

We should note that this approach assumes that other technological affordances and individual preferences outside of the SOU framework that potentially influence perceptions and uses of cars as avatars (e.g., financial means, environmental attitudes) are held constant. The generalizations offered here are based on factors most relevant to the SOU framework, all other factors being equal.

### *(Mostly) Self-Representation*

You consider the car to be a reflection of who you truly are. You have made a large number of decisions about the car's appearance and other characteristics to represent your identity. You are only concerned about the car's performance insofar as it reflects on your identity to others, but you are ambivalent about the actual experience of using the car. Consistent with this, you are minimally concerned about whether the car's movements are determined by your actions or by autonomous-driving technologies. A vehicle used for display (e.g., at car shows) but not daily driving is a stereotypical example. Corollary examples from digital contexts include avatars in *Second Life* (Rymaszewski et al., 2007) or *Bitmoji* (Puzier & Norton, 2017) that have been significantly customized to reflect user identity and that are utilized solely as self-representations in communication with others (not for other goal pursuit).

### *(Mostly) Social Other*

The car is maximally autonomous; you have little, if any, control over the car's behaviors. You consider the car to have a unique social identity (e.g., name, gender) that is mostly distinct from yours. You are minimally concerned about any utility it provides and you do not consider it an expression of the self. Characters in the film *Cars* (2006), such as Lightning McQueen, are an example of this category in the sense that they operate autonomously, do not carry humans, and have social identities. Although there are no humans in the world of *Cars*, if a car like Lightning McQueen were to truly exist, it would exemplify this category. Corollary examples from digital contexts include personal virtual assistants (Hoy, 2018; Purington, Taft, Sannon, Bazarova, & Taylor, 2017)—such as Microsoft's Cortana, Apple's Siri, or Amazon's Alexa—with which the user interacts socially (e.g., "tell me a joke") without a specific goal beyond social interaction.

We should note that perceiving a car as a social entity is less unusual than it may seem. Just as people tend to mindlessly follow social norms when interacting with their computers (Nass & Moon, 2000), studies suggest that some people treat their cars as social entities (Sheller, 2004) by assigning them humanlike characteristics (e.g., name, gender; Benfield, Szlemko, & Bell, 2007) and perceiving humanlike faces in their front grills (Landwehr, McGill, & Herrmann, 2011; Windhager et al., 2012). Furthermore, automobiles are sometimes intentionally designed to elicit such social responses (Liem et al., 2009; Ranscombe et al., 2012).

### *(Mostly) Utility*

The car serves an important functional purpose for you, facilitating transportation from point A to B according to your standards of speed and comfort. You do not think of the car as a reflection of your identity. The car offers a minimal level of automated driving options (given contemporary standards) and you control the vehicle to the greatest extent possible. You are minimally concerned about the car's looks. A rental car is a stereotypical example. Corollary examples from digital contexts include first-person games in which the avatar is barely visible, if visible at all, to the user (e.g., as an arm), such as in *Counter-Strike* and *Portal* (Clyde & Thomas, 2008), as well as an anonymous-user icon in a shared Google document (e.g., "anonymous hippo"), which is assigned randomly (George, Dreibelbis, & Aumiller, 2013). Such avatars fulfill functional purposes and offer minimal opportunities for identification or social interaction with the avatar.

### *Self-Representation and Utility*

The car serves an important functional purpose for you (e.g., facilitating transportation) and you perceive it as reflecting your identity. Consistent with the latter, you have made many decisions about the car's characteristics in order to represent your identity. The car offers a minimal level of automated driving technologies (given contemporary standards); otherwise, you control it to the greatest extent possible. A stereotypical example is a car about which someone is an enthusiast (e.g., she displays it at car shows), but that she also drives daily. Corollary digital examples include Mii avatars in Nintendo Wii games (Jin, 2009) or *Second Life* avatars (Rymaszewski et al., 2007) when they are customized to reflect the user's identity and used to accomplish specific goals, such as playing games or navigating virtual environments.

### *Social Other and Utility*

The car serves an important functional purpose for you (e.g., facilitating transportation) and you consider the car to have its own identity that is separate from your identity. The car offers a mixture of automated driving technologies, but you do have some control over its behaviors, such as setting navigation points or driving-style preferences. A driverless taxi (e.g., future Uber) or even the assemblage of the taxi driver and car is a stereotypical example. Corollary examples from digital contexts include game characters with preexisting (uncustomized) identities, such as Mario (Vella, 2013), as well as personal virtual assistants, as described previously (e.g., Lovato & Piper, 2015), but when used to accomplish tasks (e.g., "Siri, set a 14-second timer") in addition to social interaction.

### *Social Other and Self-Representation*

You have made many decisions about the car's characteristics to reflect your own identity. Consistent with this, you see the car as a reflection of your identity. However, you also see the car as having its own identity that is distinct from yours. You are ambivalent about the actual experience of using the car and the car operates mostly autonomously, requiring little intervention from you. A stereotypical example is a personal autonomous car, audaciously displayed to make the owners' neighbors jealous. Corollary digital examples include cyberpets and virtual pets (Ahn et al., 2015), such as in *NeoPets* (Grimes & Shade, 2005),

that have been customized to reflect user identity and with which the user interacts socially (e.g., feeding virtual food), but that the user does not utilize to pursue goals.

### *Self-Representation, Social Other, and Utility*

The car represents each element of the framework. The car serves an important functional purpose for you (e.g., facilitating transportation), it has a social identity, and you perceive it as a reflection of your own identity. You have made decisions about its characteristics to represent yourself, but you also see the car as having its own identity that is distinct from yours. The car offers a mixture of automated driving technologies, but you do have some control over its behaviors, such as setting navigation points or driving-style preferences. The iconic self-driving car with a cheeky personality, KITT from the television show *Knight Rider* (1982–1986), is an example. Corollary digital examples include characters in online role-playing games, such as *World of Warcraft* (Williams, Kennedy, & Moore, 2011), and personal virtual assistants (e.g., Siri) that are utilized toward goals (e.g., game quests, GPS navigation) and that the user has customized to reflect a distinct social identity (e.g., an orc appearance, a British accent) in ways that also reflect elements of the user's own identity (e.g., competitiveness, intellectual snobbery).

## Usefulness of the SOU Framework

This proposed SOU framework of avatars—applied here to automobiles—is useful to the extent that it helps identify reliable and valid antecedents and consequences of using avatars. Presently, we offer some thinking about automobiles toward this end.

Regarding antecedents, combinations of technological affordances and individual use habits should directly influence perceptions of a medium (i.e., automobile) within this framework, as implied in the preceding examples. In addition, psychological characteristics may also have an indirect influence. In particular, self-determination theory (SDT) suggests that autonomy, competence, and relatedness are the fundamental contributors to self-determined (i.e., intrinsically motivated) behaviors (Niemiec & Ryan, 2009). The relative salience of each of these contributors differs depending on the individual or context (Ryan & Deci, 2000) and this variance may relate to differences in perceptions of cars as self-representations, social others, and/or utilities. In particular, perceiving a car as a self-representation may relate to feelings of autonomy (e.g., "I can be what I want in this car"); perceiving it as a social other may relate to feelings of relatedness (e.g., "This car is a dependable friend and confidante"); and perceiving a car as a utility may relate to feelings of competence (e.g., "I achieve my goals through this car"). Hence, priming people to consider the ways in which a car fulfills the needs for autonomy, competence, and/or relatedness in different degrees (e.g., through emphases on different elements of the technology before use) may lead to differences in perception of the car as a self-representation, utility, or social other.

Perhaps more important, perceptions of a car as self-representation, social other, and/or utility can be used to predict significant consequences of using the car. One study found support for the expectation that perceiving an automobile as a self-representation leads to safer driving, possibly because a self-representing car makes users feel more publicly identifiable, thereby increasing socially acceptable behavior (Ratan & Tsai, 2014). In particular, survey respondents who reported that their cars reflected some aspects

of their personal identity were more likely to report social closeness with other drivers, which was associated with less self-reported aggressive driving. Similarly, an experimental study found that, compared with participants primed to perceive a car in a driving simulator as a utility (i.e., "choose the car that looks the most technologically desirable to you"), those primed to perceive the car as a self-representation (i.e., "choose the car that best represents your identity") drove more considerately (more yielding to pedestrians; Ratan, Tsai, Gleiber, Kim, & Tokarski, 2015).

Another experimental study found that driving-simulator participants assigned to interact with a car-voice agent that resembled the participants' own personalities drove less safely (more accidents), possibly because they dedicated more cognitive resources to the social interaction than the driving task (Ratan et al., 2016). This suggests that the more social a car seems, the stronger the expectation that it is autonomously operated. Together, this research suggests that the SOU framework might be useful for designing transportation systems that encourage safer, more prosocial uses of these technologies.

This SOU framework may also help provide a theoretical foundation to predict openness to technology adoption, such as autonomous driving technologies. Although these technologies will likely improve safety on the road, some people may mistrust the technology or be hesitant to relegate control of the driving experience. The SOU framework suggests that the more people perceive their vehicles as representing a social other, the more willing they will be to adopt autonomous driving technologies. At least one recent study supports this expectation, finding that drivers trust autonomous vehicles more when they have anthropomorphic features, such as a name and gender (Waytz, Heafner, & Epley, 2014).

In a similar vein, this framework could be used to help predict personal car ownership preferences and brand loyalty. Regarding the former, when people perceive cars mostly as a utility, personal ownership matters to the extent that it facilitates goal pursuit. For people who can achieve transportation goals without personal ownership (e.g., through ridesharing/public transit), the more they see cars as utilities, the less likely they would be to purchase their own cars. However, others would be more likely to purchase a car if they see it as a self-representation and/or social other, especially if these perspectives are reinforced by the fulfillment of psychological needs for personal autonomy and/or relatedness, respectively.

Regarding brand loyalty, when people see vehicles mostly as utilities, brand alone (outside of utilitarian associations, like reliability) is unlikely to influence the choice to purchase or use a vehicle. Conversely, we would expect that the more people view a car as a self-representation, the more the brand would be associated with the individual's own identity, and thus increase preference for the brand, holding other factors (e.g., utility) constant. Also, we would expect that the more people view the car as a social other, the more they would feel they have a social relationship with the brand itself, which would also increase brand loyalty.

Together, this reasoning suggests that automotive companies could promote car ownership and increase brand loyalty by emphasizing design elements that encourage perceiving cars as self-representations and social others. We further posit that the SOU framework approach can be used to help identify effective design decisions to shift driver preferences in intended directions. For example, software in the vehicle could be designed to offer customization options that increase perception of the vehicle as a

self-representation, such as automatically matching the interior colors to the driver's clothing or putting a "driver-selfie" image on the dashboard. Similarly, to increase perception of the vehicle as a social other, cars could be given simple anthropomorphic characteristics (e.g., a social profile on the center console). Such features should be designed to match the level of autonomous driving technologies actually available to maintain appropriate expectations regarding the car's capabilities.

Future research should further develop this SOU framework by empirically testing the expectations offered earlier in this article as well as testing the validity of related measurement instruments. Toward this end, we offer a potential scale for measuring different perceptions of cars (or any type of avatar) as self-representations, social others, and/or utilities (see the appendix). Further, the theoretical foundations offered here should be compared to research in other fields that have dealt with related topics (e.g., product attitudes; Katz, 1960; Shavitt, 1989).

## Limitations

There are valid counterarguments to the positions offered here. First, if cars are avatars, then any vehicle (e.g., drone), outfit of clothing (e.g., uniform), customizable physical space (e.g., house)—or any object at all (e.g., tree branch)—might be an avatar as well. Perhaps the present approach is too broad to be useful to communication scholars?

We agree that many of these objects can be considered avatars, but as the SOU approach suggests, the extent to which an object is perceived and treated as an avatar depends on the technological affordances of the object and the individual user's preferences. Even a stick from a tree branch can be an avatar, perhaps, if it represents a human user through interactions with other humans, objects, or the environment. For example, a stick carved to form a pointed weapon used for fighting or hunting could serve as a self-representation, carrying marks and stains that symbolize the user's conquests and challenges. In this way, sticks may have been one of the earliest avatars of prehistoric humans, though of course, in contrast to our current technological landscape, the potential for self-representation may seem quite limited. Most sticks are not avatars and—in most cases—there is little value in contemplating whether a stick or other inanimate object qualifies as an avatar. However, we argue that there is great value in understanding the antecedents and consequences of treating objects as avatars, especially those that are central to everyday life. Research on human-robot interaction utilizes the concept of avatars to better understand the experience and effects of controlling robots (Aymerich-Franch et al., 2015; Bremner et al., 2016; Bremner & Leonards, 2016; Maeyama et al., 2001; Rich & Sidner, 2009). For example, participants who controlled a walking human robot avatar experienced similar levels of embodiment, agency, and feeling of self-location when they only had partial control of the robot compared with when they had full control (e.g., Aymerich-Franch et al., 2015). This study provides insights into the (seemingly easy) process of inducing the treatment of a humanoid robot as an avatar, but some people may even perceive and treat more mundane (but essential) objects, such as bicycles, uniforms, or houses, as avatars. More important, the type of avatar (i.e., self-representation, social other, and/or utility) may predict the outcomes of using the object. For example, just as perceiving a car as a self-representation is associated with more prosocial (i.e., safer) driving behaviors (Ratan & Tsai, 2014; Ratan et al., 2015), perceiving a house as a self-representation may be

associated with more prosocial (e.g., environmentally friendly) homeowner behaviors, and thus an intervention to encourage house-as-avatar perceptions might have positive community impacts. Hence, we believe the current approach of applying the broad concept of avatars to automobiles—or any self-representing object that affords interaction—to be of value for communication scholars because of the potential ability to predict differences in the outcomes of using the object.

A second counterargument against the current approach is that avatars are usually thought of as user representations that are physically separate from the user, excluding vessels within which the user is located. By this logic, a remote-controlled car would be an avatar, but a car with the human user in the driver's seat would not be. However, we believe that this distinction is arbitrary and unproductive. A car's driver is usually barely visible to others on the road, and thus the car itself is mostly, if not entirely, responsible for representing the driver and facilitating interactions with others and the environment. Of course, there are counterexamples, such as drivers using their hands or fingers to gesture to others in close proximity. But in typical driving scenarios, the driver's personal identity is replaced with the appearance of the vehicle, which then serves to represent the driver. Supporting this point, one study found that when drivers were induced to feel less anonymous and more publicly identifiable (i.e., they imagined they were driving in a convertible with the top down—compared to one with the top up—in a driving simulator), they drove less aggressively and dangerously (Ellison-Potter, Bell, & Deffenbacher, 2001). From the perspective of the SIDE model (Christopherson, 2007), this finding suggests that when drivers are deindividuated (hidden inside the vehicle), as opposed to publicly identifiable, they are more likely to conform to antisocial group norms (e.g., aggressive driving); this is similar to how hostility in online interactions is associated with social dominance orientation in such contexts (Tang & Fox, 2016). Further, according to a dramaturgical perspective (Goffman, 1959), the finding suggests that when drivers are publicly identifiable (i.e., in a top-down convertible), they experience the road as a frontstage environment in which the audience (e.g., other drivers, pedestrians) must be considered. In contrast, when drivers are less identifiable (e.g., tinted windows), they will be less concerned about audience judgment and may treat the vehicle as a backstage environment, thus allowing the driver to act more freely than otherwise (e.g., speeding, performing personal hygiene rituals). Other theoretical perspectives in communication, such as the hyperpersonal model (Walther, 2007), could also be brought to bear on this issue of driver identifiability, and comparisons in predictions of driver behavior would provide interesting fodder for future research. Regardless, the most relevant point at present is the implication that when a user is physically inside a vessel (e.g., an automobile), the vessel still serves as an avatar as long as the individual's identity characteristics are mostly obscured by the vessel, and thus the vessel—not the individual's body—is the primary self-representation.

A third counterargument is that even though Nowak and Fox (2018) define avatars to include nonanthropomorphic entities, they also note that people respond more strongly to avatars with more humanlike appearances and behavior (Gong and Nass 2007; Hamilton and Nowak 2010; Reeves and Nass 1996). They argue that anthropomorphism leads to the perception of social potential, which is associated with more persuasion (Fox et al., 2015; Gong, 2008; Guadagno, Blascovich, Bailenson, & McCall, 2007), physiological arousal (Lim & Reeves, 2010; Ravaja, 2009), social involvement (Bailenson, Yee, Merget, & Schroeder, 2006), and perceptions of credibility, attractiveness, and competence (Nowak, Hamilton, & Hammond, 2009; Nowak & Rauh, 2005; Westerman, Tamborini, & Bowman, 2015).

Hence, while automobiles might serve as avatars, they are not very anthropomorphic, and thus the social outcomes of interactions through or with them might be somewhat limited. We cannot refute this general point that automobiles' lack of anthropomorphism hinders social outcomes, but we assert that the present approach is still valuable because of the likelihood of relative differences. A car that is perceived as an avatar with more social potential—through physical or behavioral anthropomorphism—will lead to more socially meaningful outcomes of use than one that has less social potential. While neither car would likely have the social potential of a humanoid robot or digital avatar, the relative differences between the two types of cars are important on their own, especially given the huge prevalence of automotive technology in our society.

A final concern is the lack of consideration for economic factors that might influence the treatment of an automobile as a self-representation, social other, and/or utility. The article attempts to avoid this issue by stating the assumption that individual factors outside the SOU framework, such as financial means, are held constant. However, the variance in the amount of resources required to embody, socially interact with, and/or utilize vehicles in different degrees might still create confounding factors. For example, while the cost of an automobile to be used purely as a utility is relatively low, the cost of an automobile that exhibits social characteristics (e.g., autonomous driving, voice agent) is relatively high. This relative difference in cost could lead to differences in the experience of automobiles within the SOU framework. Future research could address this topic by looking at the cost of specific affordances that allow automobiles to be treated as mediated selves, others, and/or utilities and then incorporating the relative differences in these costs into the assessment of the SOU framework.

## Summary and Conclusion

This article has argued that cars can be understood as avatars, or avacars. This argument builds on an inclusive definition of avatars (Nowak & Fox, 2018) as mediated representations of human users that facilitate interaction with other users, entities, or environments. Cars—and avatars in general—are also considered to be social others and/or utilitarian objects in differing degrees. Thus, a Self-Other-Utility framework and measurement scale (see the appendix) is offered as a means of understanding the antecedents (e.g., motivational orientation) and consequences (e.g., driving safety, autonomous car adoption) of using avatars. Some limitations notwithstanding, the present approach offers a new perspective that can be used to expand communication scholarship into the increasingly integrated context of transportation and media technologies.

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## Appendix

### Self-Other-Utility (SOU) Scale

Purpose: to measure perceptions of avatars, broadly conceived (e.g., cars) as self-representations, social others, and/or utilities.

Prompt: To what extent do you consider your [car/avatar] to be . . .

1. A representation of your identity
2. A reflection of your personality
3. A representation of who you are
4. Another person (not yourself)
5. Someone else
6. Someone with its own personal identity
7. A tool with a purpose
8. A functional object
9. A thing that helps you accomplish goals

Response options: Not at all, Slightly, Somewhat, Greatly, Extremely

Items are expected form three orthogonal subfactors: self-representation (1–3), social other (4–6), and utility (7–9).