

Consumer and Object Experience in the Internet of Things: An Assemblage Theory Approach

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The consumer Internet of Things (IoT) has the potential to revolutionize consumer experience. Because consumers can actively interact with smart objects, the traditional, human-centric conceptualization of consumer experience as consumers' internal subjective responses to branded objects may not be sufficient to conceptualize consumer experience in the IoT. Smart objects possess their own unique capacities and their own kinds of experiences in interaction with the consumer and each other. A conceptual framework based on assemblage theory and object-oriented ontology details how consumer experience *and* object experience emerge in the IoT. This conceptualization is anchored in the context of consumer-object assemblages, and defines consumer experience by its emergent properties, capacities, and agentic and communal roles expressed in interaction. Four specific consumer experience assemblages emerge: enabling experiences, comprising agentic self-extension and communal self-expansion, and constraining experiences, comprising agentic self-restriction and communal self-reduction. A parallel conceptualization of the construct of object experience argues that it can be accessed by consumers through object-oriented anthropomorphism, a nonhuman-centric approach to evaluating the expressive roles objects play in interaction. Directions for future research are derived, and consumer researchers are invited to join a dialogue about the important themes underlying our framework.

Keywords: assemblage theory, consumer experience, Internet of Things, object-oriented ontology, self-expansion, self-extension

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INTRODUCTION

The consumer Internet of Things (IoT) is upon us, presenting new opportunities for interaction that have the potential to revolutionize consumer experience. This exciting evolution of the IoT encompasses the wide range of everyday objects and products in the real world that are able to communicate with other objects and consumers, through the internet (OECD 2015). Overall, the IoT industry is expected to be worth \$3 trillion by 2025, with over 27 billion heterogeneous things connected to the internet (Meyer 2016). In the IoT, sensors that collect data, and actuators that transmit that data, are being increasingly incorporated in all manner of consumer objects commonly found in and around the home, worn on or in the body, and used in consumption activities involving shopping, entertainment, transportation, wellness, and the like. With the

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addition of network connectivity, previously unrelated objects and products will now work together as assemblages through a process of ongoing interaction (DeLanda 2011, 2016). From these interactions, new properties and capacities will emerge that have the potential to vastly expand the range of what consumers—and objects—can do, and what can be done to and for them.

The Smart Home Is One Example of a Consumer-Object Assemblage

Lilah. Imagine a consumer, Lilah, who has installed a number of smart objects in her home. She begins her journey by purchasing a Philips Hue hub and color-changing LED light bulbs, which she installs in three lamps. With this simple consumer-object assemblage, Lilah has the capacity to set the color of her lights to match her mood. After a few weeks, Lilah installs the IFTTT (If This Then That) app on her smartphone. She uses it to code the lights to automatically turn on at sunset and off at midnight, and to change the color of the lights each day to match the Bing Image of the Day. Lilah settles into a routine where she eagerly anticipates seeing what palette her home has chosen for her that day, and smiles to herself when she sees the day's colors through the windows as she pulls into her driveway in the evening.

Collin. Lilah's husband, Collin, having noticed her fondness for the Hue lights, buys an Amazon Echo enabled with the Alexa Voice Service for Lilah's birthday. Lilah uses the voice-controlled smart object to time her French press coffee, control her lights, play her favorite Spotify playlists, and check the weather. Lilah enjoys testing Alexa by asking it questions to see if she can stump it. In contrast, Collin interacts with Alexa in a much more limited way, only asking it to tell him the time or read the morning news. Collin is unwilling to experiment and talks to Alexa in a stiff, awkward manner. Lilah tells Collin to relax when he talks with Alexa, but Collin says he needs to talk that way to make Alexa understand him.

Noah. Lilah and Collin's son, Noah, visits on a break from college and is amused seeing his parents talk to Alexa every morning. Lilah gives Noah a gift of an LG Rolling Bot (Thompson 2016), a spherical rolling smart object that Noah can use in "pet mode" with his smartphone to transmit his voice through its speakers, point a red laser pointer, and make it "dance." Noah is excited because the Rolling Bot will allow him to remotely play with his pet cat Noodle when he is away at school. After he returns to school, this assemblage develops the emergent capacity to affect Lilah and Collin, who feel connected with their son as they watch the cat interacting with the Rolling Bot, controlled by Noah from another city.

Alexa. In addition to the day-to-day responding to Lilah and Collin's requests, Alexa is gathering and storing information for the long term. Based on saved voice recordings, Alexa can learn to distinguish between Lilah and Collin. From the requests that Alexa does not understand, it can learn to better respond to such requests in the future. From the requests that Alexa does understand, it can learn how they compare to other households. Focused on their immediate interactions with Alexa, Lilah and Collin are largely unaware of Alexa's multiple secret lives as a data gatherer, a student who learns by machine learning, and a covert market researcher who provides Amazon with detailed information about how consumers are using Alexa in their homes. These metaphors help us understand what Alexa is doing, from its own point of view.

Lilah's smart home assemblage has evolved to include three lamps equipped with Philips Hue bulbs, her smartphone, IFTTT, the Bing Image of the Day, Amazon Alexa, the LG Rolling Bot, the family cat, and three humans. Within this consumer-object assemblage, there exist simultaneously a set of nested and overlapping assemblages of different spatio-temporal scales. The "Alexa time my coffee" assemblage operates each morning. The Noah-Noodle-Rolling Bot assemblage operates over great geographic distances—and, to Lilah and Collin's dismay, often in the middle of the night. The Hue lighting assemblage has expanded its physical boundaries beyond the home into the driveway where Lilah notices the lights when she comes home.

The various assemblages seem to be affecting the various consumers and objects in different ways. Collin uses Alexa in a restricted and stunted way, and feels reduced as a person, even robotic, when he talks to Alexa. Lilah and Noah enjoy expressing agentic roles that allow them to do things they could not ordinarily do, and that extend them in new ways. At times, Lilah also finds herself playing a communal role where she feels that she is collaborating in a relationship with the assemblage to create a nicer home environment. She feels that the assemblage somehow expands who she is as a person. Lilah has even found herself wondering what the world looks like from Alexa's point of view and thinks about Alexa's secret lives as a data gatherer, student, and covert researcher. She imagines her own Alexa as one of a population of millions of Alexas powered by Amazon's cloud-based service. Lilah wonders if "Cloud Alexa" might be the world's best multitasker.

Very different experiences emerge for Lilah, Collin, Noah, and Alexa. Why do different consumer experiences emerge when different consumers interact with assemblages containing smart objects? What aspects of interaction produce different experiences, and what is the role of repeated interaction, day in and day out, in creating experience? What leads experiences to be positive and enabling, rather than negative and constraining? What leads consumers to play different roles in their interactions—sometimes

agentic and independent, and other times communal and relational? Does it make sense to consider what kinds of experiences might emerge for objects in their interactions? How might consumers understand object experience?

Our example of Lilah and Collin interacting with Alexa in the home is largely a micro view of consumer and object experience assemblages that emerge from interactions in the IoT. Considered on a minute-by-minute basis, interactions between Lilah and Alexa alone generate a half-million data points over the course of a year. Thus, there is sufficient complexity in the interactions of simple consumer-object assemblages to justify initially focusing on this relatively micro level, and consideration at this level is sufficient to define consumer and object experience from an assemblage theory perspective. However, assemblage theory allows, and in fact demands, that we also provide a framework that allows interactions of IoT experience assemblages to be considered in a broader context. This is because consumer and object experiences are also shaped by broader societal influences including privacy and legal considerations (Sauer 2017), advertising and marketing (LeFebvre 2017), and even human rights domains (Gershensfeld 1999). Our goals in this article are to present a new conceptual framework, based on assemblage theory, to examine these questions.

A Nonhuman-Centric Approach

Belk (1988) has argued that objects are passive entities that consumers invest with meaning. But smart objects possess properties that make them something more than what consumers do to them. They have significant abilities to affect and be affected that permit interaction not only with consumers, but also with other objects. As Mitew (2014, paragraph 13) observes: “[s]omething strange happens however when objects acquire connectivity, semantic depth, and the powers of computation and memory—they immediately and drastically transgress the ontological borders assigned to them.” The capacities of smart objects to affect and be affected by other entities suggest that they are becoming “ontologically indeterminate and emerging entities akin to life forms” (Zwick and Dholakia 2006, 57).

Because of smart objects’ capacities to affect and be affected, traditional, human-centric conceptualizations that evaluate consumer experience from only the consumer’s point of view may not be sufficient to conceptualize experience in the consumer IoT. Therefore, to accomplish our research objectives, we adopt a nonhuman-centric framework (Hill, Canniford, and Mol 2014) that considers all entities on equal ontological footing, even as their effects may be unequal. This approach also permits consideration of how nonhuman objects might impact experiences of consumers and experience their own existence.

For us, that framework is assemblage theory, a comprehensive socio-material theory of social complexity from

the speculative realism school of philosophy (DeLanda 2002, 2006, 2011, 2016; Deleuze and Guattari 1987; Harman 2008) that emphasizes what emerges, is stabilized, and is destabilized from the interaction between ontologically equivalent human and nonhuman actors (Bogost 2012; Bryant 2011; Canniford and Bajde 2016; DeLanda 2002; Harman 2002). It challenges the dominant anthropocentric view that everything about an object is tied up in consumers’ relations to it. Instead, assemblage theory recognizes that objects have ontological weight on their own (Harman 2002) and are irreducible to their parts or relations, with properties and capacities that make them more than consumers’ perceptions or interactions with them. In the past few years, concepts from various approaches to assemblage theory and actor-network theory (Latour 2005), the “empirical sister-in-arms” to assemblage theory (Müller 2015, 30), have been applied to an increasingly broad range of consumption, consumer culture, and marketing topics (Canniford and Bajde 2016; Canniford and Shankar 2013; Epp and Velageleti 2014; Giesler 2012; Kozinets, Patterson, and Ashman 2017; Martin and Schouten 2014; Parmentier and Fischer 2015; Thomas, Price, and Schau 2013). Assemblage theory concepts have also been applied in fields as diverse as geography (Anderson and McFarlane 2011), international relations (Bousquet and Curtis 2011), and critical urban theory (Brenner, Madden, and Wachsmuth 2011), among others.

DeLanda’s approach to assemblage theory is the starting point for our theorizing, as it emphasizes the processes that give rise to emergence from ongoing interactions among heterogeneous parts. Several of DeLanda’s ideas are particularly important for our conceptual development. These include part-whole interaction, a consequence of the exteriority of relations, whereby a part can both exist by itself and as part of a larger assemblage, and also the expressive roles those parts play in interaction. DeLanda also explicitly introduces the idea of a “flat ontology” for the assemblage that is “made exclusively of unique singular individuals, differing in spatio-temporal scale, but not in ontological status” (DeLanda 2002, 51). See Belk (2014), Canniford and Bajde (2016), Marcus and Saka (2006), and Müller (2015) for detailed discussions of the similarities and differences among the various assemblage and actor-network paradigms.

Article Aims and Organization

We build on several key ideas from DeLanda’s assemblage theory to develop a conceptual framework for understanding how experience assemblages emerge and change over time from interactions between humans and nonhuman smart objects. Our conceptualization is relevant to those assemblages involving consumer interaction with everyday smart objects. These include smart home assemblages, as in the opening vignette, as well as other

consumer-object assemblages, such as those involving wearables, chatbots, self-driving cars, and robots. Our framework is also applicable to larger macro-assemblages such as smart stores, smart neighborhoods, and smart cities, as well as more traditional consumer environments where interaction with smart objects occurs.

We organize our article into five sections as follows. First, we review current theories of consumer experience and examine the construct of experience, as well as its relation to awareness and consciousness. Second, we develop a new conceptualization of consumer experience in consumer-object assemblages. This is followed by a parallel but distinct conceptualization of object experience. Next, we outline a number of potential research directions implied by our framework, including the broader socio-material implications of consumer-object interaction in IoT environments. Last, we discuss the likely implications of our framework for specific perspectives of consumer research, and identify a number of themes worthy of debate.

WHAT IS CONSUMER EXPERIENCE?

Our interest lies with the emergence of consumer experience from consumers' interactions with smart objects. We use the term "consumer" for human entities, while using "object" to refer to a range of nonhuman entities. Objects include physical smart objects such as Amazon Alexa, Philips Hue smart lights, the AutoX self-driving car, and assemblages whose components are smart objects. Objects also include nonphysical internet-connected services such as IFTTT (If-This-Then-That) or Spotify. Additionally, objects include physical nonsmart objects such as doors, lamps, electrical outlets, and speakers, as well as nonhuman living entities such as pets, that interact in assemblages with consumers and smart objects. As Bogost (2012, 12) notes, "the term object enjoys a wide berth: corporeal and incorporeal entities count, whether they be material objects, abstractions, objects of intention, or anything else whatsoever."

Prior Research on Consumer Experience

Existing literature provides a starting point for understanding the consumer experience construct. Current definitions tend to adopt a largely passive view of the consumer as a receiver of brand or marketing stimuli, and of consumer experience as a *response*. For example, Brakus, Schmitt, and Zarantonello (2009, 53) define brand experience as "subjective, internal consumer responses (sensations, feelings, and cognitions) and behavioral responses evoked by brand-related stimuli." Verhoef et al. (2009, 32) provide a similar definition: "The customer experience construct is holistic in nature and involves the customer's cognitive, affective, emotional, social, and physical responses to the retailer."

The literature recognizes that consumer experience is emergent (Thompson, Locander, and Pollio 1989) as well as distinct from and "something more" than the products and other components with which consumers interact (Abbott 1955; Alderson 1957; Lemon and Verhoef 2016; Pine and Gilmore 1998). Emergent consumer experience is both holistic (Verhoef et al. 2009) as well as multidimensional. While the specific dimensions vary somewhat by researcher, five key dimensions, which we term the "BASIS" properties of experience, are consistently mentioned: behavioral (or physical), affective (feelings: emotional, experiential, or hedonic), sensory (or sensations), intellectual (cognitive or rational), and social (Brakus et al. 2009; De Keyser et al. 2015; Gentile, Spiller, and Noci 2007; Holbrook and Hirschman 1982; Klaus and Maklan 2012; McCarthy and Wright 2004; Schmitt 1999, 2003; Verhoef et al. 2009; Verleye 2015).

There is agreement that interaction is necessary for consumer experience to occur. Brakus et al. (2009, 54) observe that experiences "occur whenever there is a direct or indirect interaction." De Keyser et al. (2015) explicitly incorporate interaction in defining consumer experience as "comprised of the cognitive, emotional, physical, sensorial, and social elements that mark the customer's direct or indirect interaction with a (set of) market actor(s)." That interaction is required for consumer experience is axiomatic: "[t]he first basic tenet of CX is its interactional nature, meaning that a CX always stems from an interaction" (De Keyser et al. 2015). Interaction is thus a prerequisite "building block" (Prahalad and Ramaswamy 2004) from which experience originates.

In sum, current definitions of consumer experience view it as a holistic, multidimensional response that requires interaction. Yet this definition is insufficient because in their interactions, *both* consumers and smart objects have the capacity to take action, in addition to responding to action taken by the other. Thus, we are missing something if we do not also include an explicit consideration of the paired capacities (DeLanda 2011, 2016) exercised by consumers and smart objects during interaction. During interaction, the "capacities [of one entity] to affect must always be thought in relation to capacities [of another entity] to be affected" (DeLanda 2011, 4). How the consumer affects a smart object is as much a part of experience as how the consumer is affected by a smart object, even if their effects are not equal. This is our starting point for an assemblage theory-based broadening of the consumer experience construct. We will go much further, but first we discuss the nature of experience itself.

Levels of Experience

Calder and Malthouse (2008, 3) note that "Experiences are inherently qualitative . . . they are composed of the stuff of consciousness. They can be described in terms of the

thoughts and feelings consumers have about what is happening when they are doing something.” While individual experience is subjective (Thompson et al. 1989), we may still ask: What is experience? How is it different from awareness and consciousness? Who—or what—can have an experience? Where do experiences begin and end?

Subjective experience has been consistently equated with consciousness (e.g., Morin 2006), and the terms experience, awareness, and consciousness are used interchangeably by different authors. Yet the terms are not equivalent, leading to confusion among what are actually different concepts (Vanechoutte 2000). The problem arises largely because the literature recognizes multiple levels of experience (Chalmers 1995; Vanechoutte 2000), as well as multiple levels of consciousness (Farthing 1992; Morin 2006; Natsoulas 1978; Schooler 2002; Tononi and Koch 2015). While there is disagreement on what the levels should be called (e.g., Morin 2006), we view experience at three distinct levels, ranging from basic experience to aware experience to conscious experience (Chalmers 1995; Vanechoutte 2000).

Basic Experience. Basic experience is the lowest, most fundamental level of experience of an entity (Chalmers 1995). At this primary level, Vanechoutte (2000, 432) claims that even enzymes can have experiences, such as “when the appropriate substrate is present in the immediate environment of an enzyme, it is recognized by the active site of the enzyme and this leads to action.” Such low-level experiences represent a type of pattern recognition (Vanechoutte 2000). Because smart objects rely on machine learning for their intelligence, and machine learning is a sophisticated evolution of pattern recognition (Carbonell, Michalski, and Mitchell 1983), this supports the idea that smart objects can have basic experiences. From an assemblage theory perspective, pattern matching corresponds to the paired capacities of entities to affect, and be affected by, each other (DeLanda 2011, 2016). As fundamental emergent outcomes of exercised paired capacities, basic experiences involve not only human but also nonhuman entities, and constitute the raw material from which the second level of experience—aware experience—can emerge.

Aware Experience. The second level, aware experience, involves how the brain or processing system recognizes, organizes, and attends to the input of basic experience. These “easy problems” of consciousness (Chalmers 1995) include the “ability to discriminate, categorize, and react to environmental stimuli,” “the ability of a system to access its own internal states,” “the focus of attention,” and “the deliberate control of behavior” (Chalmers 1995, 1). The easy problems are still complex, but are potentially explainable through computational or neuroscience approaches. Aware experience is “the result of filtering and processing” basic experience (Vanechoutte 2000, 439). While it is obvious that humans

have the capacity for filtered and processed aware experiences, it is also the case that smart objects ranging from smart light bulbs to self-driving cars also have such capacities. Thus, smart objects can have aware experiences. Note that our use of “aware experience” is distinct from the term “self-awareness” (Morin 2006), which corresponds to conscious experience.

Conscious Experience. At the third level, we have conscious experience. These “hard problems” of consciousness (Chalmers 1995) involve how the awareness processes of input recognition, organization, and attention are integrated to produce subjective experience. These conscious experiences are emergent in that they are distinct from, and “something more” than, both the consumer and the objects with which the consumer interacts. The key to understanding the nature of conscious experience is in understanding the nature of the “something more” that emerges from interaction. The problem, however, is that what is “something more” is also largely ineffable. In philosophy, descriptions of the essence of experience have taken the form of “something it is like” to subjectively undergo that experience (Chalmers 1995; Nagel 1974).

Conscious experiences exist at a wide range of spatio-temporal scales. The fact that we may speak of “an experience” implies that an experience has a beginning and an end, defining its temporal depth (Bluedorn 2002). Roto et al. (2011) contrast three temporal depths of experience—momentary, episodic, and cumulative. The granularity of the smallest units of momentary experience is quite small, with Tononi (2004, 3) noting that “a single conscious moment does not extend beyond 2–3 seconds.” Over the longer term, episodic experience emerges as a broader experience based on a series of momentary experiences. Episodic experience represents a “succession or flow of conscious states over time” (Tononi 2004, 9). Over the still longer term, cumulative experience reflects a retroactive appraisal formed after a series of episodic experiences (Arieli 1998).

Conscious experience itself can be graded (Tononi and Koch 2015) and emerges from the capacity of the interacting components of a system to integrate information with the consciousness of a system, living or nonliving (Tononi 2004, 2008). This suggests that it is “likely that all mammals have at least some conscious experiences” (Tononi and Koch 2015, 14; de Waal 2016). Thus, there are degrees to which entities can be said to have conscious experience, and conscious experience is not the exclusive domain of humans.

A NEW CONCEPTUAL FRAMEWORK FOR CONSUMER EXPERIENCE

The Nested Assemblages of Experience

Consumer experience can be thought of as an assemblage, which allows us to draw on key tenets from

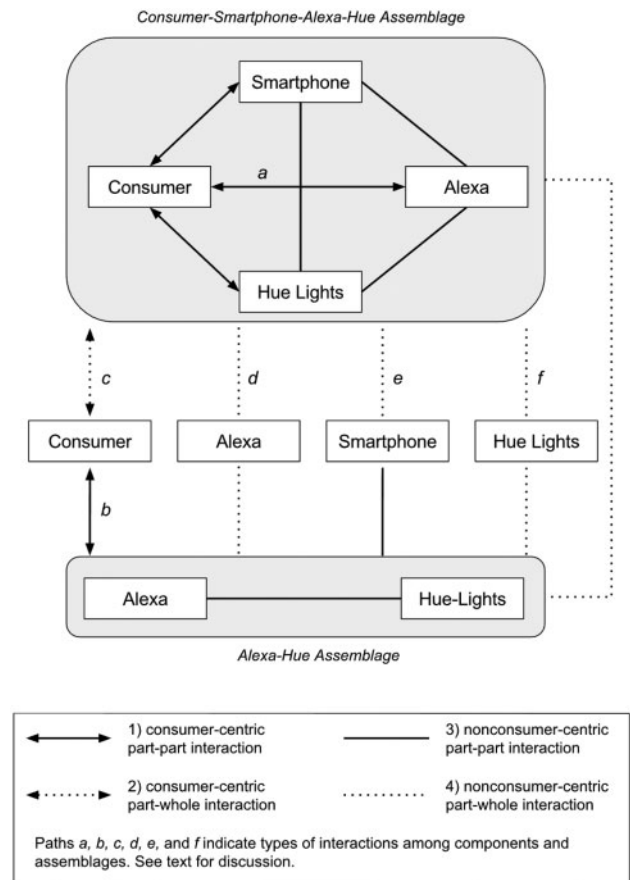
assemblage theory for our conceptualizing (Canniford and Bajde 2016; DeLanda 2002, 2006, 2011, 2016; Deleuze and Guattari 1987; Harman 2008). First, the axiomatic role of interaction in consumer experience parallels the fundamental role of ongoing interaction in an assemblage. Second, an integrated experience emerges that is something more than the consumer and objects that interact to produce the experience, and is irreducible to its component parts. Third, experience has properties (i.e., BASIS and other characteristics) that result from the exchange of paired capacities (i.e., bidirectional interaction) and play expressive roles through their components (i.e., experience has qualitative, subjective aspects). Fourth, experiences, as assemblages, occur at a range of spatio-temporal depths and degrees of complexities of interactions, so that they occur over both short and long time frames, can themselves be experienced, and can contain other experiences. For example, momentary experiences are nested in episodic experiences, which are in turn nested in cumulative experiences.

While it is clear that we may think of experience as an assemblage, in order to define and understand consumer experience assemblages, we must first define more general consumer-object assemblages. Consumer experience assemblages and consumer-object assemblages both involve interactions among the same components. The difference between these two related assemblages lies in the types of interactions that are involved.

Consumer-Object Assemblages. A consumer-object assemblage emerges from four types of interactions involving parts and wholes: 1) *consumer-centric part-part* interactions between consumers and objects, and 2) *consumer-centric part-whole* interactions between consumers and assemblages, where the consumer is one of the components of the assemblage. Both of these types of interactions are consumer-centric because they *always* involve the consumer as one of the interacting entities. Consumer-object assemblages also emerge from: 3) *nonconsumer-centric part-part* interactions between objects and objects, and 4) *nonconsumer-centric part-whole* interactions between objects and assemblages, where the object is one of the components of the assemblage. These latter two types of interactions are nonconsumer-centric because the interactions *never* involve the consumer as one of the interacting entities. These four types of interactions are illustrated in figure 1.

Part-Part and Part-Whole Interaction. Figure 1 illustrates interactions in an assemblage of four components, shown at the top, within which is nested a second assemblage of only two of those components. Solid lines indicate part-part interactions, and dashed lines indicate part-whole interactions. Consumer-centric interactions are represented by double arrowheads, and nonconsumer centric interactions are represented without arrowheads. First, consider

FIGURE 1
CONSUMER-CENTRIC AND NONCONSUMER-CENTRIC INTERACTIONS



part-part interactions (solid lines). Path *a* in figure 1 shows the consumer-centric part-part interaction of the consumer with an Amazon Alexa device. Part-part interactions may also involve parts that are themselves assemblages. Path *b* in figure 1 shows the consumer-centric part-part interaction of the consumer interacting with the Alexa-Hue assemblage.

The second type of interaction is *part-whole* interaction (dashed lines). When an assemblage emerges from the interaction among its parts, the whole can interact with and affect those parts through part-whole interaction (DeLanda 2006, 34), setting them “into new vibrations” (Harman 2008, 371). Additionally, the parts can affect the whole (Canniford and Bajde 2016), also resulting in change over time. This is possible because, owing to exteriority of relations, parts exist independently from the assemblages with which they interact. As an example, the consumer (path *c*), Amazon Alexa (path *d*), the smartphone (path *e*), and the Hue lights (path *f*) all separately interact through

part-whole interaction with the same assemblage, of which each is a part.

Consumer Experience Assemblages. A consumer experience assemblage emerges from the consumer-centric interactions (the lines with arrowheads in figure 1) within a given consumer-object assemblage. The consumer-centric interactions are from the consumer's point of view, corresponding to the subjectivity of consumer experience. This means that a consumer experience assemblage is always *contingent* upon the existence of a consumer-object assemblage. The consumer and the consumer experience assemblage are nested within the larger consumer-object assemblage like Russian dolls (Bennett 2010; Canniford and Bajde 2016). In addition, nested within the consumer experience assemblage are other overlapping experience assemblages corresponding to specific types of consumer experience that we develop subsequently.

Nonconsumer-centric interactions (the lines without arrowheads in figure 1) do not contribute directly to the consumer experience assemblage. However, they indirectly impact consumer experience since object-object interactions may affect subsequent consumer-centric interactions. An object, through its interactions as part of an assemblage, might change in some way over time. Any resulting changes in an object may impact subsequent consumer-centric interactions involving that object.

A Fuller Understanding of Consumer Experience from Assemblage Theory

The historically contingent *identity* of an assemblage is defined by its emergent properties and capacities that arise from interaction among its component parts, as well as the expressive roles played by components during interaction (DeLanda 2011, 2016). Properties are measurable characteristics that specify what the entity (component or assemblage) is. Capacities are directional and specify what the entity does, or what can be done to it. In addition, in interacting through their capacities, components play either a material (i.e., structural, infrastructural, mechanical, operational, or functional) or expressive (i.e., conveying meaning) role, depending on which capacities are exercised (Canniford and Shankar 2013; DeLanda 2011, 2016; Parmentier and Fischer 2015). Thus, properties specify *what* an assemblage is, capacities specify *how* an assemblage interacts, and material and expressive roles specify *why* the interactions have meaning.

We use these concepts to define the construct of consumer experience as the identity of the consumer experience assemblage. That is, consumer experience is the properties, capacities, and expressive roles of the consumer experience assemblage. We note that the consumer-object assemblage, which the consumer experience assemblage is contingent upon and nested within, has a separate identity

defined by its own properties, capacities, and expressive roles. Note that our use of the term “identity,” as derived from DeLanda, is distinct from its use as synonymous with self, sense of self, and psychological identification (Ahuvia 2005; Belk 1988; Reed et al. 2012).

Properties of Experience. As an assemblage, consumer experience is characterized by its emergent measurable intensive, extensive, and qualitative properties (DeLanda 2002). The multidimensional BASIS (behavioral, affective, sensory, intellectual, and social) properties of consumer experience provide a starting point for understanding consumer experience. However, current measures of the five BASIS properties of experience are limited to how the consumer is affected. For example, we can use a scale item adapted from Brakus et al. (2009) to measure the sensory property of how Lilah, in our opening scenario, is affected by Amazon Alexa: “Amazon Alexa’s voice makes a strong impression on my senses.” But our framework argues that it would also be fruitful to measure the sensory property of how Lilah affects Amazon Alexa—for example, with the item: “The sound of my voice gets a reaction from Amazon Alexa.” Since properties of an assemblage emerge from the paired directional capacities that are exercised in interaction, it will be important to measure the outcomes of not only how the consumer is affected by objects, but also how the consumer affects objects.

Capacities of Experience. Capacities of the consumer, both to affect and to be affected, have been largely neglected in the context of consumer experience. Their numerosity is likely one reason for their neglect. DeLanda (2011) notes that capacities “form a potentially open list” compared to the finite number of properties of an assemblage, because through interaction new capacities are continually emerging. We focus our attention on two broad categories: 1) the capacities of parts to enable and constrain the whole, and 2) the capacities of the whole (i.e., the assemblage) to enable and constrain its parts. Paraphrasing two questions posed by Price (2017)—“how do actors shape markets?” and “how do markets shape actors?”—we ask how consumers and assemblages enable and constrain each other.

That parts can affect wholes is evident from the very emergence of assemblages from the interactions of their component parts. “Wholes emerge in a bottom-up way, depending causally on their components” (DeLanda 2016, 21). Conversely, once an assemblage has emerged from interactions among its component parts, the assemblage then “has emergent capacities to constrain and enable its parts” (DeLanda 2016, 17). In contrast to an upward causality of assemblage formation, this is now a “downward causality” or “top-down influence” whereby “once an assemblage is in place it immediately starts acting as a source of limitations and opportunities for those components” (DeLanda 2016, 21).

Expressive Roles of Experience. In interacting through their capacities, components play either a material or expressive role, depending on which capacities are exercised (Canniford and Shankar 2013; DeLanda 2011, 2016; Parmentier and Fischer 2015). Over time, the emergent expressive roles played by a consumer, in part-whole interactions of the consumer with the consumer-object assemblage, become a part of consumer experience. These interactions in consumer-object assemblages have a historical component, with outcomes of past interactions influencing current and future interactions. Because of the contingent history underlying interaction, the consumer's interactions with the assemblage may be considered relational (Aggarwal 2004). This allows us to consider the emergent expressive roles of consumers, in their part-whole interactions with the consumer-object assemblage, in terms of distinctions along the agency and communion orientations in relationships with others (Kurt and Frimer 2015).

Assemblage Theory Framework for Enabling and Constraining Consumer Experiences

We build on these ideas to introduce to the domain of consumer experience: 1) the capacities of the consumer to enable or constrain an assemblage of which the consumer is part, and 2) the capacities of the consumer to be enabled or constrained by the assemblage. In their part-whole interactions with consumer-object assemblages, consumers will express 1) agentic roles when they enable or constrain the consumer-object assemblage, and 2) communal roles when the consumer-object assemblage enables or constrains the consumer. These roles, and their mapping to part-whole interaction, constitute additional aspects of consumer experience that, as far as we are aware, research has not considered to date.

Table 1 defines the four specific consumer experience assemblages that emerge from part-whole interactions, whereby consumers have the agentic capacity to enable or constrain consumer-object assemblages, or have the communal capacity to be enabled or constrained by consumer-object assemblages. Each of these is nested within the larger consumer experience assemblage, as shown in figure 2. Our framework for enabling and constraining experiences allows us not only to connect the constructs of self-extension (Belk 1988) and self-expansion (Aron et al. 1991), but also to consider their relatively ignored respective "dark sides" of self-restriction and self-reduction. Enabling experiences of self-extension and self-expansion are generally paths to territorializing the consumer experience assemblage and stabilizing its identity. However, by adding components or enabling interactions, consumers can also deterritorialize and destabilize the assemblage. Constraining experiences of

self-restriction and self-reduction are generally paths to deterritorializing, destabilizing, and reterritorializing the assemblage. For example, limiting capacities serves both to deterritorialize and to reterritorialize around new, even if more constrained, parameters.

Enabling Experiences of Extension and Expansion

Self-Extension Experience. The literature on self-extension (Belk 1988, 2013, 2014) describes how "individuals cathect objects with meaning and extend their identities from themselves into objects and other people" (Belk 1988). Through self-extension, physical and digital possessions can contribute to consumers' identities and function to extend their sense of themselves, bringing more meaning to their lives. Instead of considering self-extension of consumers into objects, we consider self-extension of consumers into consumer-object assemblages. Since the consumer is a component of the assemblage, self-extension involves part-whole interaction.

Self-extension is consistent with an agentic orientation (Pierce, Kostova, and Dirks 2002). Agentic interactions characterize effectance and independence (Guisinger and Blatt 1994). Agency, associated with constructs like competence and independent self-construal, is important to self-related goals (Abele and Wojciszke 2007; Judd et al. 2005). Consumers are agentic when striving to individuate and differentiate the self, and express traits of agency by acting on or asserting themselves (Abele and Wojciszke 2007). As consumers focus on exercising capacities that emphasize self-related goals, their capacities will express an agentic role as they are injecting their identity into the assemblage. Thus, self-extension experiences involve the agentic transfer of the consumer's capacities into the assemblage, and correspond to the capacity of the part (i.e., the consumer) to enable the whole (i.e., the assemblage). The upper-left quadrant of table 2 provides a brief vignette of self-extension experiences.

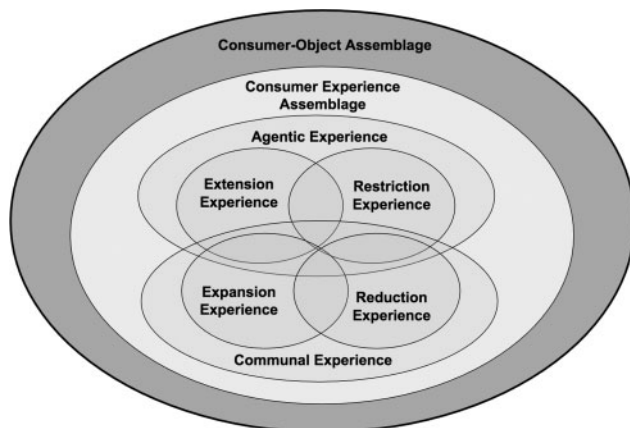
Self-Expansion Experience. The literature on self-expansion describes how "individuals treat a close other's resources, perspectives, and identities as if these were their own" (Aron et al. 1992) by incorporating aspects of a close other into one's self (Aron et al. 2004; Reimann et al. 2012). Self-expansion is consistent with a communal orientation (Carpenter and Spottswood 2013; Xu, Lewandowski, and Aron 2016). People express communion through their social connections to others and their needs to incorporate the social environment into the self (Abele and Wojciszke 2007). Communion, associated with nurturance and interdependent self-construal, is important to relationships with others (Abele and Wojciszke 2007; Judd et al. 2005). Rather than considering self-expansion from others, we are

TABLE 1
ASSEMBLAGE THEORY FRAMEWORK FOR ENABLING AND CONSTRAINING CONSUMER EXPERIENCES

	Consumer plays an agentic expressive role	Consumer plays a communal expressive role
Enabling experience paths to territorialization and reterritorialization	Self-extension part (consumer) enables the whole (consumer-object assemblage) Consumer exercises their capacities, adds components, and/or enables interactions in the assemblage. New capacities of the assemblage emerge as a result.	Self-expansion whole (consumer-object assemblage) enables the part (consumer) Consumer treats the emergent capacities of the assemblage as if they are their own. The person has more capacities by being part of the assemblage.
Constraining experience paths to deterritorialization	Self-restriction part (consumer) constrains the whole (consumer-object assemblage) Consumer removes components, limits capacities of components, and/or impedes interactions in the assemblage. Fewer capacities of the assemblage emerge as a result.	Self-reduction whole (consumer-object assemblage) constrains the part (consumer) Consumer capacities are constrained as a result of the emergent capacities of the assemblage. The person has fewer capacities by being part of the assemblage.

FIGURE 2

NESTED AND OVERLAPPING EXPERIENCE ASSEMBLAGES CONTINGENT ON THE CONSUMER-OBJECT ASSEMBLAGE



considering the consumer's self-expansion from a consumer-object assemblage. In this context, self-expansion involves the communal part-whole interactions of the consumer with the assemblage. The upper-right quadrant of [table 2](#) illustrates self-expansion experiences.

As consumers focus on communal interactions emphasizing integration ([Guisinger and Blatt 1994](#)), aspects of a consumer-object assemblage's identity are absorbed into the consumer's identity. In self-expansion experiences, the consumer has more capacities by being part of the assemblage. The consumer is enhanced and becomes more than

they are by interacting with the assemblage. Thus, self-expansion experiences involve the communal absorption by the consumer of the assemblage's capacities, and corresponds to the capacity of the whole (i.e., the assemblage) to enable the part (i.e., the consumer).

Constraining Experiences of Restriction and Reduction

Self-Restriction Experience. Self-restriction experiences involve the consumer's agentic expressive role in part-whole interaction, where the consumer has the capacity to constrain the assemblage. There are many ways a consumer can constrain a consumer-object assemblage, including removing components, limiting capacities of components, and impeding interactions among components of the assemblage. Due to the consumer's agentic restrictions, fewer capacities of the assemblage emerge. The consumer slows, hinders, and even sabotages the assemblage's capacities, effectively putting the assemblage in a straitjacket.

When consumers restrict the capacities of the assemblage, they are restricting what can emerge from the consumer-object assemblage. Since the restriction is imposed on the assemblage by the consumer, it represents an agentic rejection and denial of what is possible. It is not the case that the consumer does not see all the different ways to interact with objects as part of the assemblage. Rather, the consumer is aware of these ways of interacting but reacts against them, for example, because they perceive a threat to their personal freedoms ([Brehm and Brehm 1981](#)). A brief illustration of self-restriction experiences appears in the lower left quadrant of [table 2](#).

TABLE 2
EXAMPLE VIGNETTES OF ENABLING AND CONSTRAINING EXPERIENCES

Enabling experiences	
<p>Self-extension Noah. When Noah interacts with his pet cat, Noodle, through the LG Rolling Bot, Noah’s material role of mechanically controlling the Rolling Bot and receiving notifications shifts to an agentic expressive role through which Noah actively takes charge and monitors Noodle when he is away at college. In so doing, Noah transfers his own existing capacities for monitoring Noodle, capacities that he has developed as part of his own identity in other assemblages, into the consumer-object assemblage. This type of interaction serves as an agentic injection of Noah’s previously developed capacities for monitoring into what the assemblage can do, extending the range of his own eyes and ears into the assemblage.</p>	<p>Self-expansion Noah. Noah’s same material capacities of controlling the LG Rolling Bot and receiving its notifications shift to play a communal expressive role through which Noah thinks about his relationship with Noodle. Noah absorbs the assemblage’s capacity to physically be present with the cat and play with it. What the assemblage can do is incorporated into Noah, expanding his ability to care for and enjoy his cat, even when he is away. Noah is thus integrated with the assemblage’s capacities, becoming something more by being able to do, from a distance, what the Rolling Ball does. Because of this, Noah feels like he is taking much better care of Noodle than he ever has before.</p>
Constraining experiences	
<p>Self-restriction Collin. Unlike his wife Lilah, Collin interacts with Amazon Alexa in a very limited way. Collin’s use of Alexa is limited to asking about the time or morning news. Collin’s agentic restrictions on what he asks Alexa to do restrict, in turn, the capacities of the assemblage. Instead of transferring a much broader set of capacities into Alexa, Collin is choosing to withhold his capacities from Alexa. Collin has the capacity to have Alexa control the home’s lights or listen to his favorite music the way Lilah does. Because Collin does not exercise his capacities, the assemblage will not develop related emergent capacities and the identity of Collin’s consumer experience assemblage will be diminished.</p>	<p>Self-reduction Collin. When Collin interacts with Amazon Alexa, he sounds like he is reading from a prepared script. He always asks his questions in the same way using a limited, stunted syntax and vocabulary to ask Alexa what time it is, or to read him the morning news. Collin feels a bit silly when he talks to Alexa. He feels that he becomes less of a person by having to interact in a way that is required to pair with what Alexa can do. Collin is reduced and diminished as a person, yet he agrees to become so since he plays a communal role in the assemblage because he wants the benefits of what the assemblage can do. While Collin benefits from what he and Alexa can do together, he feels like something about himself is lost in the process.</p>

Self-Reduction Experience. Self-reduction experiences involve the consumer’s communal expressive role in part-whole interaction, where the assemblage has developed the emergent capacity to constrain the consumer. Since the consumer is playing a communal role, they willingly accept the constraints imposed on them by the assemblage. Yet, even though the constraints are accepted, they may produce negative outcomes. This happens because the consumer exercises their capacities during interaction with a given assemblage in ways that are “less than” how those same capacities may be exercised in other contexts. As a consequence, the consumer is diminished and becomes less by interacting with the assemblage. The lower-right quadrant of table 2 presents a brief vignette of self-reduction experiences.

A key mechanism through which assemblages constrain their parts is repetition *without* difference. Whereas repetition with difference territorializes an assemblage and facilitates its emergent identity, repetition without difference leads to what Lanier (2010) calls “lock-in,” resulting in a stagnant assemblage that constricts what is possible going forward. A locked-in assemblage—repeating the same interactions because of the limitations of rigid software, for example—constrains what the consumer, as part of the assemblage, is capable of doing and experiencing. This may be related to cognitive lock-in, in which skill-based habitual use locks consumers into a particular product alternative (Murray and Häubl 2007).

CONCEPTUALIZING OBJECT EXPERIENCE

Agency, Autonomy, and Authority of Smart Objects

The computer science literature has long recognized the roles of agency, autonomy, and authority in intelligent objects (Franklin and Graesser 1996; Jones, Artikis, and Pitt 2013; Luck and d’Inverno 1995). Smart objects have agency to the extent that they possess the ability for interaction, having the capacity to affect and be affected (Franklin and Graesser 1996). This explicitly implies a goal (Borgerson 2005, 2013). Smart objects are autonomous to the degree they can function independently without human intervention (Parasuraman, Sheridan, and Wickens 2000) and interact independently with other entities, “in pursuit of [their] own agenda” (Franklin and Graesser 1996, 25). Authority concerns the degree to which smart objects with agency and autonomy have the rights to control how they respond to other entities and how other entities respond to them (Hansen, Pigozzi, and van der Torre 2007). A smart object’s contextual connections confer upon it the authority to give instructions to other smart objects and make decisions about its own and other objects’ operations during interaction (Abowd and Day 1999; Perera et al. 2013).

Consider the intriguing smart object experiment involving Brad the Toaster (Rebaudengo 2014; Rebaudengo, Aprile, and Hekkert 2012). Brad is an internet-connected toaster networked to other toasters. Brad's purpose is to be used for making toast. Brad knows how often it is used for making toast, compared to how often other toasters on the network are being used. If Brad determines it is not being used enough, it will flip its lever repeatedly to get the consumer's attention and encourage more use. Brad tweets its sentiments about its usage, orders bread to be delivered from the local grocery store to encourage more usage, and may even arrange for UPS to pick it up if it determines its usage is too low. Brad the Toaster exhibits agency, is autonomous as its actions are motivated from within itself, and has authority because its contextual connections give it the right to give or get instructions to or from other smart objects and make decisions about its own and other objects' operations. For Brad the Toaster, and other similar smart objects, these behaviors can be interpreted as social (Mitew 2014).

Object Experience

The Object Experience Assemblage. The properties of agency, autonomy, and authority give smart objects the capacities to affect and be affected in interaction with other smart objects and with consumers. Conceptually, some of these capacities will contribute to basic experiences and others to a higher level of aware experiences. Smart objects' capacities to affect other entities and be affected by them render them capable of basic experience. Smart objects' agency, autonomy, and authority also give them the capacities for filtering and processing the basic experiences that lead to aware experiences. Our conceptualization of object experience does not require smart objects to have conscious experiences in order to have some type of experience. For smart objects, experience, at least not yet, is not equivalent to consciousness.

Object experience is an assemblage in the same way that consumer experience is an assemblage. The object experience assemblage emerges from all the interactions that involve the object. These *object-centric* interactions involve the part-part interactions between the object and other parts like consumers and other objects, as well as the part-whole interactions between the object and assemblages of components of which the object is also a component. While the object experience assemblage is defined by different interactions among entities than the consumer experience assemblage, both of these experience assemblages are contingent on the existence of the same consumer-object assemblage within which they are nested. Additionally, in even the simplest assemblage of a consumer and an object, part-whole interaction implies that we are not merely considering the interaction of the consumer and object with each other, but rather the separate interactions of each of

the consumer and the object with an historically contingent consumer-object assemblage, resulting in different experiences for consumer and object.

Enabling and Constraining Object Experiences. Object experience is defined by its emergent properties, capacities, and expressive roles. These represent the identity of the object experience assemblage derived from all the object-centric interactions. Object experience is unknowable, but as we propose below, may be apprehended through a particular form of metaphor.

An object's properties of agency, autonomy, and authority determine its specific capacities to act independently, communicate, and make decisions. As with consumer experience, emergent capacities of the object experience assemblage can be defined in two categories, as: 1) the capacities of the object to enable and constrain the whole, and 2) the capacities of the whole to enable and constrain the object. During interaction, smart objects are also hypothesized to play agentic or communal expressive roles in their interactions with consumers and objects, depending on which capacities are exercised. Research focused on developing intelligent agents and sociable autonomous robots that can work in collaboration with humans support this theorizing. Independent agents can dynamically learn to compete or cooperate as a function of the environment in sequential social dilemmas (Leibo et al. 2017). Platooning strategies of autonomous vehicles represent agentic (leader) and communal (collaborative and follower) behaviors (Fernandes and Nunes 2012; Gerla et al. 2014). Autonomous robots can acquire the capacity to independently perform complex tasks (agentic) and cooperate "shoulder-to-shoulder" with humans (communal) based on capacities of each (Breazeal, Hoffman, and Lockerd 2014).

The agentic capacity of objects to enable or constrain consumer-object assemblages, combined with the communal capacity of objects to be enabled or constrained, leads to four specific object experience assemblages. This framework, illustrated in table 3, parallels our conceptual framework for enabling and constraining consumer experiences and permits us to speculate about these experiences from the perspective of the object. To illustrate these types of object experience, we return to Brad the Toaster, the internet-connected toaster networked to other toasters. Brad's objective is to be used and its behavior reflects this goal. In brief, Brad enables the assemblage when it flips its lever to attract attention, orders bread from the local store, or tweets about how it is used (object-extension). Brad is also enabled by the assemblage when it compares its usage to that of other toasters in the network (object-expansion). On the other hand, Brad constrains the assemblage by texting UPS to come and pick it up when it determines it is not used enough, thereby removing itself from that household (object-restriction). Brad is also constrained by the assemblage when the household assemblage runs out of bread

TABLE 3

ASSEMBLAGE THEORY FRAMEWORK FOR ENABLING AND CONSTRAINING OBJECT EXPERIENCES

	Object plays an agentic expressive role	Object plays a communal expressive role
Enabling experience paths to territorialization and reterritorialization	Object-extension part (object) enables the whole (consumer-object assemblage) Object exercises its capacities, acquires new capacities, and/or acquires new components with which it can interact. New capacities of the assemblage emerge as a result.	Object-expansion whole (consumer-object assemblage) enables the part (object) Object treats the emergent capacities of the assemblage as if they are its own. The object has more capacities by being part of the assemblage.
Constraining experience paths to deterritorialization	Object-restriction part (object) constrains the whole (consumer-object assemblage) Object removes components, limits capacities of components, or impedes interactions in the assemblage.	Object-reduction whole (consumer-object assemblage) constrains the part (object) Object capacities are constrained as a result of the emergent capacities of the assemblage. The object has fewer capacities by being part of the assemblage.

and Brad is not able to exercise its capacity to be used for toast (object-reduction).

and incorporate physical actions through robotic assistance, an increased range of entities will influence and enable consumer experience both within and outside the home.

DIRECTIONS FOR FUTURE RESEARCH

We use our framework to derive four broad directions for future programmatic research that follow directly from our conceptualization of experience in the consumer IoT, including: 1) considerations of how experience assemblages are embedded in broader socio-material networks, 2) processes of assemblage formation, 3) implications for consumer experience, and 4) implications for object experience. These research directions are mapped to key constructs in our framework in figure 3, and summarized in the web appendix.

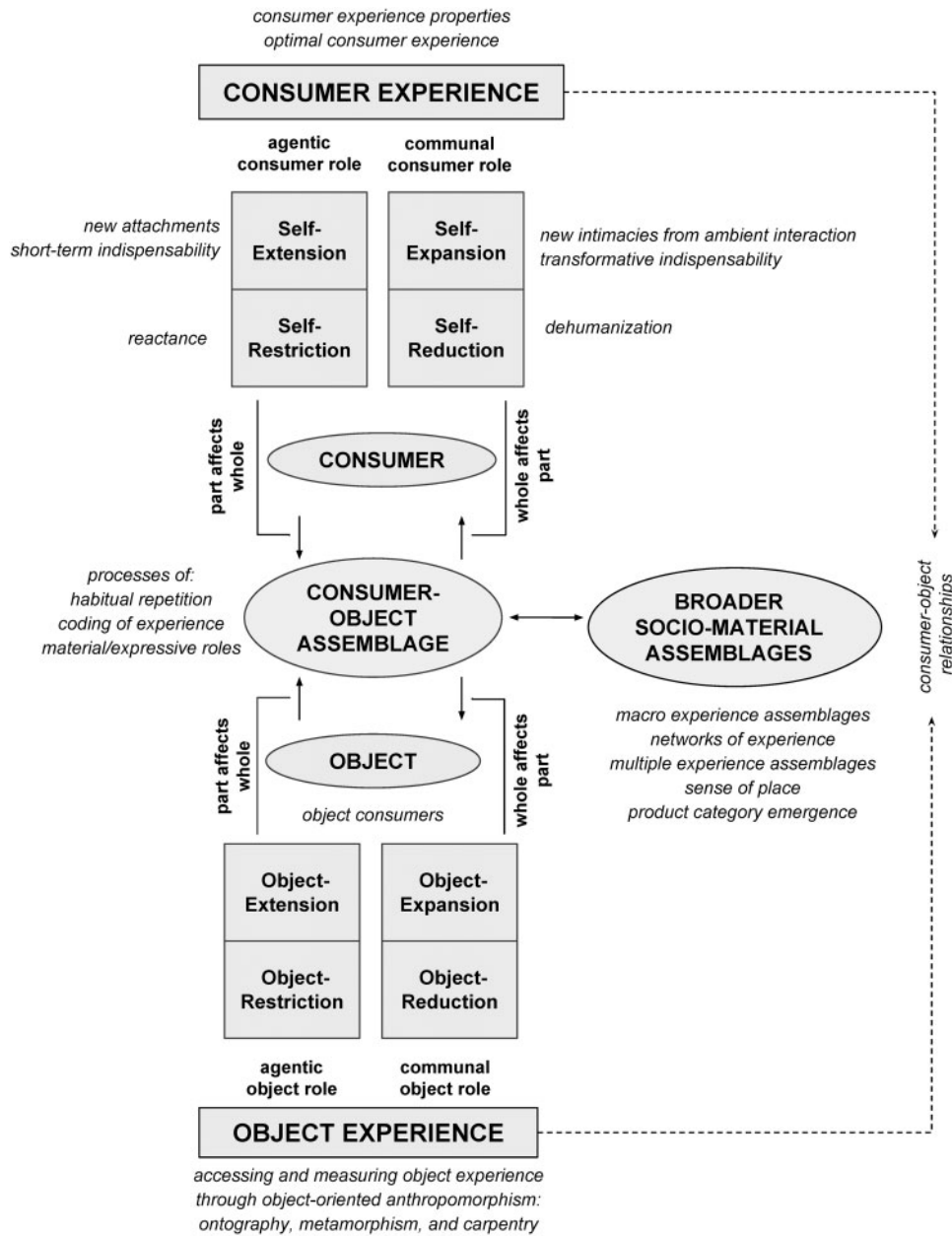
Experience Assemblages Are Embedded in Broader Socio-Material Networks

The consumer experience literature has identified the critical role of macro-level influences on micro-level experiences (Chandler and Vargo 2011; De Keyser et al. 2015; Grewal, Levy, and Kumar 2009; Ma et al. 2011). As networks of interactions, experience assemblages are nested within, and overlap with, even broader socio-material assemblages (Kozinets et al. 2017; Parmentier and Fischer 2015; Price and Epp 2016). For example, continually expanding capacities of Amazon Alexa products permit the consumer-Alexa assemblage to interface with broader communication assemblages outside the home, as when Alexa voice calling enables home-to-home interaction, turning Alexa into an always-on smartphone. More generally, as smart objects move beyond the domain of sound into sight,

Macro Experience Assemblages. The millions of household-level assemblages of consumers interacting with their individual smart objects collectively define macro consumer, macro object, and macro consumer-object assemblages, irreducible to their parts. For example, through cloud-based machine learning, Cloud Alexa tightly integrates the experiences of millions of individual consumer-Alexa assemblages. There is “something it is like” to be Cloud Alexa interacting with millions of households. Alexa, as well as Alexa’s experience, simultaneously exists at both micro and macro levels. In contrast, while an individual consumer has their own experience, is there a corresponding collective experience of millions of consumers? Tononi and Koch (2015) take one extreme, arguing there is “nothing it is like” to be a superordinate entity of one million consumers that collectively have an experience. At the level of integration of actual thought, millions of consumer experiences are literally nothing more than millions of consumer experiences. However, brand communities (Muniz and O’Guinn 2001) and consumer tribes (Cova, Kozinets, and Shankar 2011) suggest consumers come together as parts of a broader assemblage that has its own experience distinct from that of its parts. Still, since consumers’ brains are not (yet) directly connected to each other, while the intelligence of smart devices is directly connected, we argue that a macro object and its experience will have a clearer identity than a macro consumer and its experience.

FIGURE 3

KEY CONSTRUCTS AND CORRESPONDING RESEARCH DIRECTIONS FROM OUR ASSEMBLAGE THEORY FRAMEWORK FOR CONCEPTUALIZING CONSUMER AND OBJECT EXPERIENCE IN THE IOT



We can consider a 2×2 framework, with the two rows defined by micro and macro consumers, and the two columns by micro and macro objects. The cells then define consumer-object assemblages, at various combinations of micro- and macro-level consumer and object components. How do components and assemblages enable and

constrain each other, within and across levels? Is there a primacy of macro objects over macro consumers in their capacity to enable and constrain? A macro object assemblage, such as Cloud Alexa, can interact with large numbers of individual consumers as parts of a macro consumer assemblage.

An additional question when aggregating consumers or objects into macro assemblages is where we stop. In a sense, aggregation never stops. Smart objects are increasingly able to communicate with each other, and, at some point, it may be possible to consider an assemblage of all smart objects. The dividing line of which assemblages belong in a macro-assemblage should be appropriately expanded or contracted to suit the analysis problem at hand. This is an advantage of the assemblage theory approach to consumer experience, because it permits multiple simultaneous analyses, at different levels of analysis, for different views and insights into experience assemblages.

Networks of Experience. The Internet of Things enables a new information supply chain (Downes 2009). An Amazon Dash Replenishment Service-enabled printer not only reorders when its own printer cartridge is low, but can also collectively report the toner levels and usage trajectories of millions of installed printers. With this information, manufacturers know which printers in which locations need new cartridges at which points in time. How are consumers and other entities that are in privileged positions in these intersecting assemblages poised to benefit from the networked information supply chain?

Relatedly, we envision new networks of experience, much like networks of desire (Kozinets et al. 2017), that will let consumers extend and expand their capacities into broader intersecting assemblages that reach beyond their immediate consumer-object assemblages. As smart objects increase their connections into broader assemblages, how will consumer experience be enabled, rather than constrained? Lanier (2010) observes that “those of us close to privileged internet nodes might come to enjoy extraordinary benefits as . . . technologies progress into the digital realm.” Could we expect new digital divides (Hoffman and Novak 2000) based on consumer access to these networks of experience? Will macro object assemblages similarly benefit from their privileged positions in such networks where they can simultaneously enable or constrain millions of individual consumers?

Multiple Consumer Experience Assemblages. Consumer-object interactions often involve multiple consumers—for example, at home in family contexts (Epp and Price 2010; Price and Epp 2016). Eventually smart objects will have the capacity for true multi-user interaction. Currently, Amazon Alexa devices do not have the capacity to identify, or even to differentiate among, the different family members with whom Alexa interacts. However, one of Alexa’s competitors, Google Home, recently implemented the capacity to identify as many as six different family members by the sound of their voice (Barrett 2017). Does the ability of a smart object to recognize and satisfy the preferences of a particular person produce superior consumer experience in a multiperson household? Will it facilitate extension experiences, but hinder expansion

experiences and possibly lead to restriction experiences? When might multi-user recognition capacity shift a household member’s expressive roles from communal to agentic by inducing competition for the object’s attention? Important research questions center on the potentially conflicting enabling and constraining experiences likely to arise when object interaction happens in multi-user social contexts.

Sense of Place. Our approach may have much to offer the ambiguous and ill-defined concept of sense of place (Deutsch and Goulias 2012; Deutsch, Yoon, and Goulias 2013; Manzo 2005; Shamai and Ilatov 2005; Sherry 2000; Tambyah and Troester 1999). In our framework, sense of place represents those physical contexts in complex interactive environments that render experience real. Place is of critical importance for smart objects in the IoT, since these objects are located in, and can define the meaning of, physical space. The nesting of consumer-object assemblages within broader place-based assemblages delineates expanding geographic boundaries of experience. Since place is a complex macro object, we view sense of place as a consumer experience assemblage that emerges in the context of a consumer-place assemblage. In turn, micro consumer-object assemblages may be nested within a consumer-place assemblage. Sense of place is consumer experience of place, and there is a corresponding object-oriented perspective whereby place has an experience of consumers. A multilevel assemblage theory view of sense of place may help guide sharper definition and measurement of the construct through the lens of consumer experience.

Product Category Emergence. Throughout this article, we use Amazon Alexa products in many of our examples of consumer-object assemblages. Like other new product introductions such as the iPad, the product category to which Alexa belongs is an emergent assemblage. As Ritchie (2014) reminds us, Steve Jobs emphasized the “magical” and “revolutionary” qualities of the iPad, even as people mocked the name and seemed confused about how to categorize it. It was only as populations of consumers experimented with and interacted with the iPad in a broad range of socio-material contexts that the identity of the tablet category was territorialized. Similarly, there is no clear consensus today about the name of Alexa’s product category, which has been variously referred to as a smart speaker, voice AI, voice assistant, digital voice assistant, AI assistant, conversational interface, and intelligent personal assistant. There is even less consensus surrounding the identity and meaning of Alexa’s product category. Assemblage theory has proven useful as a way to understand the emergence of product, market, and cultural categories (Dolbec 2015), and we believe our framework may provide a useful mechanism for understanding the emergent identity of the product category assemblages for Alexa and other IoT smart products.

Processes of Assemblage Formation

Habitual Repetition. Consumer experience is not the result of a single interaction event, but the repeated exchange and habitual repetition of paired capacities in back-and-forth sequences of interactions over time. This is not mechanical cookie-cutter repetition, but repetition combined with difference (Deleuze and Guattari 1987). Such repetition is a “creative response that seeks to reproduce the essence of prior performances across different relations, capacities, and territories” (Price and Epp 2016, 67), and is the main process by which the consumer experience assemblage is territorialized (DeLanda 2006; Deleuze and Guattari 1987; Wise 2000).

In consumer-object assemblages, much, if not most, of the habitual repetition of interaction is among objects, rather than between consumers and objects. Through programming, consumers may offload routine behaviors to smart objects that operate autonomously. DeLanda (2011) notes that capacities do not have to be actually exercised to be real. Can capacities be even one step further removed, if the consumer has self-expanded and absorbed an assemblage’s autonomous capacities as their own? Does the self-expanded consumer internalize offloaded routine behavior performed by objects as if they themselves had done it?

Emergent capacities can also be exercised in imagined interaction (De Keyser et al. 2015; Helkkula, Kelleher, and Pihlstrom 2012; Honeycutt 2003, 2009). This is closely related to the idea of imaginative capacity, or “the potential to creatively envision components interacting in a reassembly” (Epp, Schau, and Price 2014, 88). For example, if a burglar breaks the glass door, I know my home security alarm has the capacity to sound a loud siren. I feel my house has the property of being secure even though these capacities have never been exercised. How does imagined habitual repetition impact consumer experience?

Bottom-Up Coding of Experience. Recurrent processes of territorialization, deterritorialization, and reterritorialization (DeLanda 2006, 2011, 2016; Deleuze and Guattari 1987) explain how consumer experiences assemblages come to be, and serve to change these assemblages by stabilizing or destabilizing their identities. Territorialization is an identity formation process that sharpens the spatial and temporal boundaries of the consumer experience assemblage, while also increasing the internal homogeneity of the assemblage through practices of inclusion and exclusion, routinization, habitual repetition, and common motivation (DeLanda 2006). Subsequent to territorialization, recurrent processes of coding reinforce territorialization effects, consolidating and fixing the identity of an assemblage (DeLanda (2006, 2011, 2016).

Coding enables the offloaded habitual repetition we just considered. The need for, and ability of, consumers to literally code smart objects by programming them leads to a strong role for coding in consumer-object assemblages

(Rowland et al. 2015). Routines, procedures, and if-then programming rules used by consumers to formalize rituals, such as setting their lights to specific colors and intensities for television viewing, code consumer-object interactions in individualized and bottom-up ways. This is in contrast to top-down coding of traditional media interactions. For example, mass-market smart televisions code human-object interaction from the top down so consumers necessarily interact with their smart televisions in similar ways. In contrast, individual bottom-up codings allow commonalities to emerge from the ways different consumers code their interactions. Consumer-generated if-then rules for connecting smart objects can provide the raw material for automated detection of categories of human actions through machine learning based on inductive programming (Gulwani et al. 2015). What common ways of interacting are likely to emerge from individual codings, and how can we identify them, for example, with visualization tools such as topological data analysis (Lum et al. 2013; Novak and Hoffman 2016)?

Shifting Material and Expressive Roles. One enabler of repetition with difference is the shifting material and expressive roles that components play in interaction (Harman 2008). In consumer-object assemblages, there is a mechanical, Lego-like aspect to first connecting smart objects to each other based on their material roles. Smart lights, cameras, beacons, locks, and other smart objects initially play material roles as they are installed on a network and connected to each other. These roles shift from material to expressive as components exercise their capacities. The material interactions of lights coded by programmed rules might serve as an ambient identity cue (Cheryan et al. 2009), where the lights shift to play an expressive role signifying their agency and autonomy. In doing so, interactions shift from instrumental and pragmatic to non-instrumental and hedonic (Carver and Scheier 2001; Hassenzahl 2001, 2010; Hassenzahl, Diefenbach, and Göritz 2010; Pucillo and Cascini 2014).

Roles also shift from expressive to material. A consumer who expresses their taste for music by telling a smart music system to skip songs they do not like will give the system an understanding of their preferences. The expressive feedback becomes a material capacity of the system to match the consumer’s preferences to a database of other users, to calculate probabilities that future music recommendations will be favorably received, and ultimately to play more songs the consumer will like. Do shifts from material to expressive roles impact consumer experience in a fundamentally different way than shifts from expressive to material roles? How can shifts between material and expressive roles be detected and measured?

Implications for Consumer Experience

New Intimacies from Ambient Interaction. In consumer behavior, interactivity typically involves active, direct

manipulation of objects (Schlosser 2003). In contrast, interaction in consumer-object assemblages is heterogeneous, ranging from ambient to direct, with ambient interaction as background, peripheral “standby” passive interaction (see Hoffman and Novak 2015; Vogel 2005 for a fuller treatment), and direct interaction as foreground, back-and-forth active interaction. Ambient interaction is akin to Harman’s (2005) muffled “black noise,” while direct interaction is “white noise.” Owing to the nature of smart objects, much, if not most, interaction in consumer-object assemblages is arguably ambient. Research can examine our expectation that self-extension experiences will tend to be defined by direct interactions, while self-expansion experiences will emerge more often from largely ambient interactions. How does the sense of connection resulting from these black-noise interactions, termed “ambient intimacy” (Case 2010; Makice 2009; Reichelt 2007), emerge as a property of self-expansion experiences?

Ambient interaction is closely related to the idea of brand invisibility (Coupland 2005), in which habitual processes of crypsis, mimicry, and schooling behavior camouflage a brand over time. These processes provide a rich description of the ways that ambient interaction occurs, as when, for example, smart objects blend into the home environment (crypsis), take on the appearance of traditional products (mimicry), and coalesce in groups of smart objects that have their own emergent identity (schooling behavior). Will ambient interactions result in assemblages playing expressive roles?

Lewicki, Tomlinson, and Gillespi (2006) note that casual and unintentional repeated ambient interactions strengthen interpersonal trust. Will the house’s lights engender trust and begin to “seem alive” as they behave on their own, often unpredictably (Waytz et al. 2010)? If so, could this lead to intellectual or affective consumer experience (Brakus et al. 2009), as the consumer imagines, akin to interpersonal perception (Kenny 1994), what the home may be thinking or feeling?

New Attachments with Active Objects. Brand attachment refers to the “strength of the bond connecting the brand with the self” (Park et al. 2010, 2) and has been linked to self-extension (Belk 2013, 2014; Kleine and Baker 2004) and self-expansion (Reimann et al. 2012). How do self-extension versus self-expansion experiences differentially affect consumer attachment to the active objects they interact with in consumer-object assemblages? Can our framework of agentic and communal enabling and constraining experiences offer greater clarity on the role of self-expansion versus self-extension in attachment and loyalty outcomes (Thomson, MacInnis, and Park 2005)? While the literature typically views these outcomes as arising in the mind of the consumer as a result of passive interaction, our framework argues for a more active and agentic

conceptualization of these constructs in the context of smart objects.

Smart object attachments are also likely to be impacted by interaction proximity. We expect that self-extension experiences will be more likely to emerge from direct interaction in close proxemic zones, while self-expansion experiences will be more likely from ambient interaction in far proxemic zones. Closeness is defined not just by physical distance (Christian and Avery 2000; Hall 1966; Streitz et al. 2005) but also by orientation and direction of movement (Ballendat, Marquardt, and Greenberg 2010; Wang et al. 2012). Construal-level theory (Trope and Liberman 2010) suggests that communal self-expansion experiences resulting from ambient interactions in far proxemic zones will involve high-level, abstract construals. Conversely, agentic self-extension experiences resulting from direct interactions in near proxemic zones may involve low-level, concrete construals. We expect these relationships to have important implications for research on consumer choice and decision making.

Indispensability. By encouraging ongoing use of products in an assemblage, enabling experiences can lead consumers to feel the assemblage is indispensable. Indispensability stems from micro-level practices that establish daily routines, leading to ritualization of activities (Hoffman, Novak, and Venkatesh 2004). Research may examine how the nature of indispensability is likely to differ for extension and expansion experiences. Because self-extension experiences are agentic, they may correspond to a short-term path to indispensability. For example, Noah’s self-extension experience from using the Rolling Bot to play with his cat provides a relative advantage to him, but this experience assemblage could be “easily shaken by the introduction of an innovation that better meets the individual’s needs” (Hoffman et al. 2004, 42). In contrast, self-expansion experiences may take a more transformative path to indispensability. Noah’s self-expansion experience, where he has absorbed the capacities of the Rolling Bot assemblage into himself and has become a better pet owner, “represents a long-term, persistent change in the individual’s feeling and inherent belief system” (Hoffman et al. 2004, 42).

Restriction from Reactance. Self-restriction experiences are likely to represent a form of reactance (Brehm and Brehm 1981), where consumers actively impose restrictions on their behaviors in interactions with the assemblage in order to manage perceived threats to their autonomy. These restrictions can involve *whether* objects in the assemblage are used, how *frequently* objects are used, or, most critically, *how* objects are used in the assemblage. When consumers actively restrict exercising their own capacities, this may restrict usage variety (Ram and Jung 1990), leading to less actualized use innovativeness (Ridgway and Price 1994) and lower creative consumption

(Burroughs and Mick 2004). Research could fruitfully address the antecedents and consequences of the threats to personal freedom posed by consumer–smart object assemblages.

Dehumanization from Reduction. With self-extension the consumer can do more, and with self-expansion, the consumer can become more. Conversely, with self-restriction the consumer does less, and with self-reduction, the consumer becomes less. We think dehumanization is likely from disruptive technologies, but most often from self-reduction experiences. In self-reduction experiences, the consumer's capacities when interacting with the assemblage are constrained because they must pair with the capacities of the objects with which the consumer is interacting. In this sense, self-reduction may represent Haslam's (2006) mechanistic dehumanization, in which humans are contrasted with machines and must behave in ways that work with the object. At the same time, in self-reduction, the expressive role is communal, rather than agentic. Aspects of "communal sharing" (Fiske 2004; Haslam 2006), present in self-reduction experiences, would seem consistent with animalistic dehumanization. Thus, research could investigate the negative cognitive and emotional outcomes of both types of dehumanization (Bastian and Haslam 2011) that are likely to result from self-reduction experiences.

Consumer Experience Properties. Beyond the BASIS properties, an assemblage theory perspective opens the door to consideration of a host of additional properties of consumer experience assemblages. Assemblages are spatio-temporal networks of interacting components. Accordingly, characteristics of consumer-object networks also constitute measurable properties of consumer experience. The patterns of interactions between consumers and objects that emerge over time specify properties of experience. Thus, formal measures of centrality, density, connectivity, and clustering from network analysis (Brandes and Erlebach 2005) operationalize further properties of consumer experience assemblage. More holistically, we may assess the strength or intensity of experience (Tononi 2004, 2008; Tononi and Koch 2015).

Optimal Consumer Experience. DeLanda (2016, 19) has noted that the degree of territorialization is a "parameter, or variable coefficient" of assemblages (DeLanda 2016, 19). Thus, the overall degree of territorialization is a higher-level property of consumer experience. How can this territorialization parameter of the consumer experience assemblage be measured? How does the degree to which assemblages are, or are perceived by the consumer to be, territorialized contribute to consumer experience? We expect that changes in the value of the territorialization parameter over time, resulting from shifts in the balance between territorialization and

detritorialization processes, may impact experience in a manner similar to the way that the balance between skill and challenge over time impacts flow (Hoffman and Novak 1996). Correspondingly, we may conceive of an optimal "experience channel" analogous to the flow channel in models of flow (Ellis, Voelkl, and Morris 1994; LeFevre 1988; Nakamura 1988; Wells 1988). Can we define optimal consumer experience in terms of the balance of territorialization and detritorialization processes over time and, if so, how? What are the most important paths that consumer experience journeys (Lemon and Verhoef 2016) take, and what triggers transitions between types of experience, such as from self-expansion to self-reduction, or from self-reduction to self-extension?

Implications for Object Experience

Accessing Object Experience Through Object-Oriented Anthropomorphism. If experience is "something it is like," then what *is* it like to be an object? An early foray into considering the phenomenology of objects suggested that object experience can be approached from two perspectives: what is it like for a human to be an object, and what it is like for an object to be an object (Nagel 1974)? The former is an example of anthropocentric anthropomorphism (Epley, Waytz, and Cacioppo 2007), represented in table 4, which involves interpreting the world in ways that are consistent with ourselves. In this human-centered perspective, we might ask, "What's it like for me to be a smart toaster?" We could make assumptions about objects through our own subjectivity, imagining, for example, how Brad the Toaster is like me in some ways, but different from me in others. The problem with this approach is that it assumes our own subjectivity is the ideal lens.

Recently, Bogost (2012) has argued that anthropomorphism may be applied as a metaphor to understand object experience from the object's perspective. So we can "metaphorize" the object's experience using nonhuman-centric anthropomorphism. Object-oriented anthropomorphism, also illustrated in table 4, serves as the bridge between our own reality and that of the object's reality. This approach involves imagining the experience of the object relative to *its* properties and capacities, not ours (e.g., what the LG Rolling Bot camera "sees" is relative to its sensor, not the human eye). Object-oriented anthropomorphism describes a different, albeit more demanding, approach to how consumers might learn to interpret the behavior of smart objects using the language of their own experience to understand objects on their own terms as objects. As consumers are likely to anthropomorphize the smart object assemblages they interact with (Pieroni et al. 2015; Sung et al. 2007), an important question for future research will be how to stimulate this reflective process of nonhuman-centric anthropomorphism.

TABLE 4

CONTRASTING ANTHROPOCENTRIC ANTHROPOMORPHISM AND OBJECT-ORIENTED ANTHROPOMORPHISM

	Anthropocentric anthropomorphism	Object-oriented anthropomorphism
Object experience question addressed	What is it like for a human to be an object?	What is it like for an object to be an object?
Lens used to imagine experience	Consumer-centered (human)	Object-centered (nonhuman)
Properties and capacities referenced	Consumer's	Object's
Knowledge required of object	Minimal	Extensive
Anthropomorphic process	Automatic	Reflective
Example	Brad repeatedly flips its levers. Brad the Toaster is unhappy when it is not making toast and flips its lever angrily to get my attention. How a consumer would feel if she were a lever-flipping smart toaster hungry for another slice of bread to toast.	Brad repeatedly flips its levers. Brad the Toaster's lever flipping behavior is an expression of Brad's attempt to get my attention. This is because Brad knows from communicating with other toasters in the network that it is not being used enough compared to these other toasters and Brad has the "desire" to be used. What Brad may experience from its perspective as a smart toaster.

Measuring Object Experience Through Ontography, Metaphorism, and Carpentry. We think that mining the secret life of objects presents an enormous opportunity for consumer culture theorists. How can we construct the metaphors that will help us understand the expressive roles smart objects play in interaction? Bogost (2012) proposes using a trio of “alien phenomenology” tools—ontography, metaphorism, and carpentry—to speculate about what it means for an object to be an object. Ontography includes creating visual representations, descriptive lists, and even simulations to elucidate the relations among objects. The history of all commands heard by Alexa, translated into the words as Alexa understood them, along with Alexa’s responses, shows the world as Alexa sees it, revealing something about the nature of object-centric interaction. This history is an example of an ontography of Alexa that shows how the object is connected not just to the consumer through the voice commands issued, but also to the other objects Alexa is networked with. Two particularly promising directions for ontography can be found in object-oriented ethnography (Arnold et al. 2016) and photographic collections of electronic objects reassembled in ways that illuminate their object-centric experience (McLellan 2013).

In metaphorism, we invoke object-oriented anthropomorphism to try to understand the perceptions and experiences of objects from their own perspective. Instead of trying to describe the effects of object interaction, we metaphorize what expressive roles are played in interaction. Thus, what might it be like for Alexa to constantly listen for the “wake word” (its name, Alexa) and then respond to commands? How do objects perceive the interactions captured by ontography? We think much exciting research can be done examining consumers’ perceptions of the agentic and communal roles that objects express

through their capacities during interaction, and their impact on experience.

With carpentry, we can construct artifacts that “explain how things make their world” (Bogost 2012, 93). Carpentry underlies the design of interfaces for understanding the experience of consumer IoT objects. Dashboards in the smart home are one example of carpentry that allows the consumer to visualize how the various components of smart home assemblages interact (Schmidt, Doeweling, and Mühläuser 2012). Another is the IoTxMR, an intriguing augmented reality demonstration of how smart objects in the home can be controlled by glances and gestures (Pal 2016). Such demonstrations reflect a human attempt to represent how the smart home sees its world. Or consider a house outfitted with sensors that collect data on things like motion, temperature, and water flow. The home’s entire experience and understanding of its occupants is through the interactions with these sensors. Activity recognition modeling based on machine learning constructs models of interaction from sensor data (Cook and Krishnan 2015) and represents another exciting avenue for constructing object-centric experiences.

Consumer-Object Relationships. Because consumer interactions with smart objects (and consumer-object assemblages) have a relational nature, one may evaluate consumer perspectives on the interactions in the consumer experience and object experience assemblages by referencing them to social relationships (Fournier 1998). In our framework, consumer-object relationships emerge from the interaction between the consumer experience and object experience assemblages. Through capacities developed from and exercised during habitual interaction, consumers play agentic and communal expressive roles in the consumer experience assemblage. Then, through processes

like metaphorism, consumers perceive that the new capacities objects develop in their interactions in the object experience assemblage will express these roles as well. We expect that the types of relationships that are likely to develop between consumers and objects will evolve over time as descriptive properties of the relationship assemblage (Hoffman and Novak 2017).

Because our framework permits evaluation of emergent expressive roles from both the consumer's and the object's perspectives, a potentially rich set of relationships can be explored in future research. For example, consumer master-object servant relationships are likely to emerge naturally in interactions between consumers and smart objects. This is because consumers innately tend to see themselves as more agentic, compared to how they see others (Abele and Wojciszke 2007, 2014). Depending on the pairing of agentic and communal expressive roles, a number of different relationship styles are likely to arise.

Object Consumers. Marketers view "intelligent agents" as tools that improve the effectiveness of their marketing efforts to human consumers (Kumar et al. 2016), but what happens when the agent *is* the consumer? Can a smart object be viewed as a consumer that can be understood and marketed to directly? Our framework explicitly admits consideration of a smart object as a kind of consumer, an "object consumer," interacting with all the assemblages of which it is a part, and from which object experience emerges as a distinct assemblage. Our object consumers evoke Rust's (1997) early idea of "computer behavior," along with Campbell and McHugh's (2016) concept of "inter-object consumption" and Kozinets et al.'s (2017, 678) suggestion that software agents represent "agentic actors" that can be considered as "types of consumers who partake as active partners" in the various consumption processes.

Object consumers may be relevant in future research endeavors in several ways. First, what is the impact on experience of object consumers' affective responses; for example, as when Brad the Toaster is not being used as much as it thinks it should be and tweets to its host that it feels "pretty useless compared to others" (Mitew 2014)? Social robotics is a rapidly expanding area of human-robot interaction that strives to explicitly enable these kinds of emotional exchanges between smart objects, and between smart objects and consumers (Breazeal, Dautenhahn, and Kanda 2016; Pieroni et al. 2015). However, social robotics relies on anthropocentric anthropomorphism to gauge interaction quality. Incorporating the idea that objects have experiences that can be understood through object-oriented anthropomorphism holds potential to enhance the ways in which interaction is measured and perhaps even impact robot design.

Second, how do object consumers make decisions and participate in consumption; for example, as when smart

refrigerators, through a smartphone app, show consumers at the grocery store the inside of their refrigerator and suggest products and recipes contingent on what the consumer already has at home? Amazon's Dash Replenishment service allows washing machines, pet feeders, and printers to reorder laundry detergent, pet food, and printer cartridges on their own when they are running low (Rao 2015). Walmart has proposed a consumer IoT system to track the movement and consumption of consumer products in the home for the purposes of reminders and recommendations, automatic reordering, and cross-selling (Natarajan and High 2017). Under what conditions will consumers be willing to grant authority to smart objects to participate in these shared consumption tasks? Will consumers need to approve every purchase decision made by an object, or will they be willing to give objects *carte blanche*? By ceding authority to an Amazon Dash button, consumers are effectively giving up their prerogative to evaluate alternative brands and compare prices. Is there a difference between those decisions and consumption tasks we are willing to enter into jointly with smart objects versus decisions we are comfortable delegating to smart objects to make on our behalf? As object consumers learn more about the humans they interact with, will they become better at predicting and satisfying our needs?

DISCUSSION

Opening a Dialogue

We have introduced a new conceptualization of consumer experience in the IoT based on assemblage theory coupled with object-oriented ontology. We anchor our conceptualization in the context of consumer-object assemblages and define consumer experience by its emergent properties, capacities, and agentic and communal roles expressed in interaction. Our framework for enabling and constraining experiences allows us to connect the constructs of agentic self-extension and communal self-expansion, and also consider their relatively ignored respective dark sides of agentic self-restriction and communal self-reduction. We also introduced a parallel conceptualization of object experience, and argued that consumers can evaluate the expressive roles objects play in interaction through object-oriented anthropomorphism. We can anticipate that our framework may raise a number of questions and criticisms in the reader's mind. In thinking through the likely implications of our framework for specific perspectives of consumer research, we identified a number of themes worthy of debate. These include the boundary conditions of our approach, the integration of extension and expansion, the value of anthropomorphism, the significance of objects in evaluations of consumer experience, and the dividing line for definitions of consumer

behavior. We briefly address each of these below and look forward to continuing the discussion.

Boundary Conditions and Brand Experience

Does our object-oriented assemblage theory view of consumer experience apply only to consumer-object assemblages involving smart objects in the IoT? Are there boundary conditions that limit the applicability of our framework to certain categories of objects, but exclude others, such as everyday “dumb” consumer products or brands? For consumer products and brands, can we meaningfully speak of exercised directional capacities, enabling and constraining experiences, and object experience? Rather than “smart” setting the boundary condition on the applicability of our framework, we propose instead that our framework provides a number of opportunities for expanding the boundaries of experience of “nonsmart” consumer products and brands.

First, traditional approaches to consumer experience measure only how consumers are affected by brands and consumer products. But consumers also affect consumer products (e.g., “hacking” their Swiffer mops with knitted reusable cleaning pads) and brands (e.g., through collectively creating and sharing social media content). Thus, just as for smart objects, measurement of consumer experience of brands and products in general should capture outcomes of both how the consumer affects, and is affected by, the exercise of paired directional capacities. Second, enabling experiences of expansion and extension are clearly relevant to brands and consumer products, as evidenced by the literatures on self-extension and self-expansion. Third, constraining experiences of restriction and reduction also apply to brands. Park, Eisengerich, and Park (2013) proposed “self-contraction” to characterize brand aversion, in opposition to “self-expansion,” which characterizes brand attachment. But self-contraction is negatively valenced and reinforces avoidance motivation, while self-reduction implies the consumer’s willing, communal acceptance of the constraints imposed by the assemblage. Our framework suggests that the dynamic between expansion and reduction goes beyond a bipolar love-hate dimension. Fourth, while likely to be controversial, we do believe that brands and consumer products can have experiences. Consumer-brand assemblages simultaneously exist at micro levels (an individual consumer and branded product) and macro levels (a population of consumers, products, the brand, marketers, retailers, and consumption situations). A brand’s experiences of brand extension (into consumers) and brand expansion (from consumers), as well as constraining experiences, are surely possible, and distinct from consumers’ experiences.

Measuring Extension and Expansion

Extension is the agentic capacity of a part to enable the whole, and expansion is the capacity of the whole to enable

a communal part. Our intent is not to reinterpret or redefine the constructs of self-extension (Belk 1988, 2013) and self-expansion (Aron et al. 1991, 1992, 2004) as they have been described in the literature. Instead, our framework represents a way to integrate these related constructs and show that they are indifferent to whether entities are consumers or objects. Our view of the differential processes that lead to expansion or extension experiences is similar to Connell and Schau’s (2013) view of extension as a strategy that extends aspects of self identity outward, and expansion as a strategy that envelops aspects of another’s identity into the self. However, our assemblage theory view speaks not to self-identity, but rather to how identity of an assemblage and its components is territorialized and deterritorialized over time. We believe this assemblage theory view of identity is compatible with prior research and allows us to consider both consumer and object experience, as well as negative restriction and reduction experiences that constrain rather than enable.

Because the properties, capacities, and expressive roles characterizing the identity of extension and expansion experience assemblages can be identified and measured, our approach can make an especially strong and needed contribution to the measurement of extension and expansion. Hoffman, Novak, and Kang (2016) found empirical support for the confusion between existing scales of self-expansion and self-extension noted by Connell and Schau (2013). Current measures of expansion and extension may not possess satisfactory discriminant validity, and the face validity of many current measures is ambiguous, with some self-expansion scale items just as relevant to self-extension, and some self-extension scale items just as relevant to self-expansion. One direction for improving the measurement of extension and expansion is to develop scale items that capture the agentic and communal roles of parts and wholes as they enable each other.

The Value of Anthropomorphism

It might seem that by proposing object-oriented anthropomorphism as the mechanism to understand the experience of objects, we are falling victim to the human-centric perspective we have worked so vigorously to reject. However, because objects are withdrawn (Harman 2005), we are necessarily required to use *some* kind of metaphor to construct our knowledge of them in the context of our respective interactions as components of a larger assemblage (Bryant 2011; Harman 2002). Owing to their capacities to affect and be affected in interaction with other entities, all objects can interpret one another through what Bryant (2011, 178) calls “translations.” Object-oriented anthropomorphism provides this translation.

Further, tools like ontography, metaphorism, and carpentry require us to take the perspective of the object, not the consumer. This has the benefit of encouraging a nonhuman-centric perspective. In fact, nonhuman-centric

anthropomorphism may actually help resist the tendency to automatically anthropomorphize smart objects. As Bennett (2010, 120) observes, object-oriented anthropomorphism protects us against anthropocentrism because “a chord is struck between person and thing, and I am no longer above or outside a nonhuman ‘environment.’”

Expanding Our View of Objects

A key assumption of our conceptualization is that objects exist independent of consumers’ interactions with them. As Bogost (2012, 11, italics original) elegantly puts it: “*all things equally exist, yet they do not exist equally.*” So, while objects (humans, smart thermostats, tables) are all different from each other, with their own properties and capacities, no objects are less than others and no objects are more real than others (“all things equally exist”). Bryant (2011) calls this flat ontology “the democracy of objects.” However, this in no way implies that smart objects’ effects are equal to those of consumers (“yet they do not exist equally”). We do not think that smart objects’ capacity for some kind of experience is equivalent to consumer experience or represents a discounting of the human experience. Rather, it is simply a recognition that objects also have an existence (Bogost 2012).

If one object is no more or less real than another, then it seems fair to pose the question: how might smart objects experience their existence? To be sure, experiences of smart objects will necessarily be different from experiences of consumers. Consumers’ capacities to cause effects can still far surpass the capacities of many other objects, smart or dumb. Nevertheless, *something* emerges from smart objects’ interactions with other entities. An experience emerges for me from my interactions with Alexa, just as an experience emerges for Alexa in its interactions with me, but these are by no means equivalent experiences. They do not exist equally.

Our assemblage theory framework incorporates the provocative idea that objects interact and those interactions can produce experiences that are not only for us or our purposes (Bogost 2012; Campbell and McHugh 2016; Harman 2005). As Canniford and Bajde (2016, 6) observe: “There is a whole lot of stuff out there doing things and objectifying other stuff without *our* involvement,” and Deleuze and Guattari (1994, 154) observe that “[e]ven when they are nonliving, or rather inorganic, things have a lived experience because they are perceptions and affections.” While consumers and smart objects have very different effects, we think there is likely to be significant value in contemplating and evaluating the role of smart object experience in considerations of consumer experience in the IoT.

What Does It Mean to Be a Consumer?

Above we suggested that there may be value in considering smart objects as consumers with their own consumption

experiences. If objects are consumers, then what does it mean to be a consumer? MacInnis and Folkes (2010, 905, italics added for emphasis) evaluate the boundaries of consumer behavior research and conclude that “consumer behavior research is distinguished from other fields by the study of the acquisition, consumption, and disposal or marketplace products, services, and experiences by *people* operating in a consumer role.” In our assemblage theory framework, consumer behavior is not just something exclusively done by and for humans. The emergence of consumer-object assemblages, which involve object-to-object interactions that already outnumber consumer-to-object interactions, strongly implies that smart objects play a role in consumption-related processes. Is it time to consider expanding the boundaries of consumer behavior? We believe that we have arrived at that place where our usual human-centric perspective may be limiting our opportunities to address these important questions about the future of consumer behavior and the object consumers we are creating.

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