

**Reflexive layers of influence (RLI):  
A model of social influence, vehicle purchase behavior, and pro-societal values**

Jonn Axsen<sup>a\*</sup> and Kenneth S. Kurani<sup>a</sup>

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**Affiliations:**

<sup>a</sup> Institute of Transportation Studies, University of California at Davis, 2028 Academic Surge, One Shields Avenue, Davis, CA, 95616, U.S.A.

\* Corresponding author. Tel.: 1 530 574 2150, Fax: 1 530 752 6572, E-mail address: [jaxsen@ucdavis.edu](mailto:jaxsen@ucdavis.edu)

## **ABSTRACT**

Understanding consumer purchase behavior will facilitate the successful deployment of new vehicle technologies that offer societal benefits—such as plug-in hybrid vehicle (PHEVs). To move beyond the rational actor model and similarly simplified behavioral approaches, this paper proposes an integrative, theoretically rich alternative: reflexive layers of influence (RLI). RLI is a framework that accounts for the role of social influence in an actor's (or car buyer's) development of pro-societal values and purchase behavior. Informed by a multidisciplinary literature review and empirical observation, RLI represents three layers that underlie the actor's behavior; social influence is characterized by different processes at each layer. The bottom layer is the actor's functional awareness of the vehicle, which can be influenced by the diffusion of simple information—such as the vehicle's existence and basic purpose—from other actors or information sources. Next is the actor's assessment of the vehicle based on perceived private and societal benefits. Assessment can be socially influenced through processes of translation, where the actor forms interpretations based on self-concept and group membership, and negotiates these interpretations through social interactions. The third layer is the actor's self-concept—and associated values and lifestyle practices. Through reflexivity, self-concept can serve to frame the actor's assessment, and can also be reinforced or altered according to their assessment, behavior, social interactions and perceived lifestyle practices of other actors. This paper applies the RLI framework to participants in a PHEV demonstration project as well as policy considerations.

## 1. INTRODUCTION

This paper proposes a conceptual framework to understand the role of social influence in consumer purchase behavior and, in particular, the development of pro-societal values. Such questions of how and under what conditions consumers buy new products (or “innovations”) are central to the successful deployment of new vehicle technologies with societal benefits. To explore such processes, transportation researchers and policymakers rely on behavioral models—sets of assumptions about what consumers do and why. Jackson (2005) outlines five broad categories of consumer behavior model relating to pro-societal consumption:

1. Expectancy-value models, such as the rational choice model, (e.g. Train, 1980), where consumers are assumed to be rational, deliberative and autonomous, calculating costs and benefits from multiple options and selecting the one that maximizes their net benefit.
2. Adjusted-expectancy-value models, such as the theory of reasoned action (Ajzen and Fishbein, 1980), which maintain the notion of cognitive deliberation, but also account for the influence of subjective norms regarding a behavior.
3. Normative models, such as value-belief-norm theory (Stern, et al., 1999), representing the development of personal pro-environmental norms based on strong altruistic or biospheric values.
4. Habit models, such as heuristics (Tversky and Kahneman, 1974), which account for the cognitive limitations of consumers.
5. Sociality models, such as symbolic-interactionism (Blumer, 1969), where consumers negotiate and create meaning for different products through social interactions.

Currently, transportation research and, in particular academic research into markets for alternative fuel and electric-drive vehicles, is dominated by the expectancy and adjusted expectancy choice models—particularly the rational choice model—despite the fact that behavioral economists, psychologists and sociologists have long established that consumers do not typically follow “rational” decision processes, e.g. (Thaler and Sunstein, 2003; Tversky and Kahneman, 1974). Jackson (2005) states that “a useful model has to account for: motivations, attitudes and values; contextual or situational factors; social influence; personal capabilities; and habits.” Jackson’s review suggests an accretion of multiple layers of understanding consumer behavior; an integrative approach may yield important insights.

The proposed framework—reflexive layers of influence (RLI)—incorporates some such depth, with particular focus on improving representations of one behavioral determinant that transportation researchers are only beginning to explore: social (or interpersonal) influence (e.g. Carrasco, et al., 2008). In other words, RLI represents how a consumer’s perceptions, values and actions are influenced by interactions with people in their social network. RLI is based on literature review and empirical observations of interpersonal interactions within a study of social networks

The next two sections summarize the literature review and empirical study, respectively. Section 4 details the RLI framework, including definitions and drivers of social influence. Section 5 illustrates the application of RLI to two case studies (narratives) constructed from interviews

with participants in a plug-in hybrid electric vehicle (PHEV) demonstration project, and Section 6 considers implications for policy. The paper then discusses the usefulness of RLI, and proposes hypotheses for future exploration.

## **2. THREE RESEARCH PERSPECTIVES ON SOCIAL INFLUENCE**

Across behavioral disciplines, there are several different perspectives and theories of social influence. This section summarizes three such perspectives, each labeled according to the assumed process of influence: diffusion, translation, and reflexivity. These perspectives are discussed in more detail and applied by Axsen and Kurani (2010).

First, is the most common approach to the adoption of new technologies: diffusion of innovations (DOI) (Rogers, 2003). Diffusion is “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003). The adoption process is assumed to be driven by the communication of information, flowing from innovators (members of the first group to adopt an idea) and early adopters (members of the second) to individuals in later categories (early majority, later majority and laggards). DOI has been criticized for many drawbacks, including a lack of emphasis on underlying motivations to adopt (Rogers, 2003) including an over-reliance on the tautology of “innovativeness” as a personality trait (Hirschman, 1980) and inability to account for dynamics in social and technology systems (Blaut, 1987).

Second, translation treats new technologies as dynamic, socially-constructed artifacts (Bruun and Hukkinen, 2003). At first, a newly introduced artifact has a high degree of interpretive flexibility; different social groups may have differing interpretations of its meaning and content which influences further technological development (Pinch and Bijker, 1984). Eventually, a state of closure or stabilization is reached as the interpretations of various social groups converge (Bruun and Hukkinen, 2003) or align (Callon, 1991; Hannemyr, 2003). As a new technology is introduced and developed, the social groups themselves may be redefined and transformed, such as through grouping around a certain cause or idea (Kline and Pinch, 1996), and the entire social system itself may shift in response to the technology in question (Law, 1992). Adoption of the artifact is driven across groups by this process of translation; new ideas and objects are negotiated and altered as a result of context and interactions among social groups (Pentland and Feldman, 2007).

Third, reflexivity is drawn from Giddens’ (1991) structuration approach to the relationship between self development and social structures in an uncertain, modern social world lacking the roles and expected behaviors enforced by tradition. In this modern world, individuals must actively seek out and define their self identity, taking on “a reflexive project” (Giddens, 1991). In this paper, reflexivity is taken to be the dynamic, continuous, self-aware process of defining and expressing oneself. An individual’s behavior is guided by efforts to establish a sense of order, direction, and development for their self-identity. As part of this project, individuals seek a lifestyle as a package of practices that are associated with their particular trajectory, such as fashion, eating, or any other “means of symbolic display” (Giddens, 1991). Thus, the purchase of a pro-societal vehicle may not just be driven by a motivation for advantageous functional

benefits, but may also be one component, or trial, of a more fundamental expression of, or shift towards, an environmental or socially-conscious lifestyle.

### **3. EMPIRICAL FINDINGS FROM PARTICIPANT ASSESSMENT OF PHEVS**

To explore the above three research perspectives, and to inform the construction of the new conceptual framework presented in this paper (RLI) a multi-method, qualitative research project was designed and implemented to collect empirical data on social influence. The sample was a subset of 10 households participating in a PHEV demonstration project conducted in the Sacramento, California region.

Research instruments included a series of semi-structured interviews. Each of the 10 “primary” households constructed a map of their social network, then recruited several of their friends or family (or other alters—members of their social network) to take part as “secondary” participants. Next, the primary household substituted a PHEV for their current vehicle for a multi-week trial. They recorded any social interactions that pertained to the PHEV in a social episode diary, and described these interactions in subsequent interviews. In the final interview, the primary household assessed the PHEV technology, then ranked how influential each social interaction was in regards to their PHEV assessment. Researchers then integrated this and other collected data to construct a narrative for each primary household and secondary participant—that is, a chronological, causal flow of experiences and events. The full methodology is explained in Axsen (2010).

Application of the three perspectives to the elicited narratives suggest that diffusion, translation and reflexivity provide different, but complementary concepts to help understand the social dynamics and negotiations observed in this empirical study (Axsen and Kurani, 2010). Results also indicate that participating households were more likely to develop and value pro-societal interpretations of the PHEV when three factors were present:

- i) the household easily formed a basic understanding of functional aspects of PHEV technology, e.g. that it can plug in and offset gasoline use with electricity use;
- ii) the household discovered some degree of supportive pro-societal values within their social network; and
- iii) the household’s self-concept and associated lifestyle practices were in a state of liminality, characterized by ambiguity, openness and indeterminacy (Turner, 1969).

### **4. AN INTEGRATIVE PERSPECTIVE: REFLEXIVE LAYERS OF INFLUENCE (RLI)**

The RLI framework was developed to integrate the research perspectives and observed behavioral patterns summarized above. This section explains RLI according to its conceptualization of: the new technology in question, the social system boundaries, the timing of purchase, and the processes of social influence that drive behavior, e.g. purchase. Where appropriate, terminology and concepts are borrowed and adapted from the three perspectives

discussed above—though in doing so, each term is carefully redefined for the present application in RLI. In some cases, new concepts are suggested based on the empirical observations.

The RLI framework is intended to be an integration of concepts that appropriately represents consumer behavior, is parsimonious, and is useful for future application. This discussion frames this model as generally as possible—allowing application to a variety of transportation (and non-transportation) technologies and behaviors with potential pro-societal benefits. However, here focus is placed on the case of pro-societal vehicles like PHEVs.

#### **4.1 The technology as a dynamic, socially-defined artifact**

RLI describes a new pro-societal vehicle as an *artifact* (as borrowed from the translation perspective). This term highlights the culturally-embedded, socially-defined nature of technology. In RLI, a new artifact is defined as an object that different actors may associate with one or more ideas that they perceived as novel, including private and pro-societal benefits. Over time the new artifact may be physically altered and its private and pro-societal benefits may be reinterpreted by actors within the relevant social system.

#### **4.2 System boundaries: Dynamics in the relevant social system**

In RLI, the relevant social system includes all individual actors and social groups that can influence potential adopters' interpretations of the new artifact, including previous adopters, observers, manufacturers, media, interest groups and governments. The term *actor* is a scalable unit of analysis—it can be an individual, household, group of friends, company, or any other social group that is relevant to the artifact in question and may at times act as single unit. The term social group distinguishes a group of actors from an individual actor.

The presence of, and relationships between, relevant actors can shift over time—sometimes as a result of the new artifact itself. For instance, the purchase and use of the artifact by an adopter in one social group may stimulate conversation and interest from actors in a more socially distant group. Through such interactions, new social ties could develop between the two social groups, and the originally weak social ties strengthened. Thus, over the course of the adoption process, the relevant social groups may be physically altered (through the addition or removal of members), or reinterpreted by an actor (like the new artifact itself). For instance, a group of actors may form around a new idea pertaining to PHEVs, such as oil independence, and their negotiated interpretations of PHEVs may change as more group members adopt PHEVs and interact.

#### **4.3 The timing of adoption: Aligning context and actor interest**

Determining if and when an actor adopts a new artifact involves the interaction of several factors, which within RLI are divided into *contextual* and *actor* factors. Contextual factors are external to the actor, and can include the actor's:

- disposable income;
- life stage, e.g. student, career, young family, or retired; and

- cycle of stock turnover, i.e. when a new artifact is needed or when an incumbent artifact needs to be replaced or displaced.

Contextual factors also include characteristics of the market, such as:

- price of artifact;
- availability of the artifact, including variety of models and features, dealership location, supply constraints and waiting lists;
- government policy relating to the artifact, e.g. tax rebates, special privileges, codes and standards; and
- marketing and advertising, or more generally, messaging efforts related to the artifact.

The importance of contextual factors can be illustrated for a hypothetical actor considering an HEV. The timing of HEV purchase, if it occurs at all, could be influenced by many factors other than the actor's motives or interests. At a certain stage in their life, they might not buy an HEV due to: low disposable income; a mismatch between lifestyle needs, e.g. recreation or a sporty look, and the available model; or a lack of need for a vehicle in general (stock turnover). Thus, given the complex interactions among contextual factors even in this simplistic example, RLI seeks to avoid the mistake of attributing the timing of new vehicle adoption to actor factors alone.

Of course, actor characteristics also matter. Under RLI, there are two main antecedents to an actor's internal motivations and intention to purchase the artifact: awareness and positive assessment. First, the actor must have awareness knowledge, i.e. knowledge that the artifact exists and is available for sale, and have some basic functional understanding of what it does, e.g. that a PHEV plugs in and/or can offer increased fuel economy. Such basic, functional understanding is required before a stable assessment can be formed.

Second, the actor must somehow form a positive assessment of the artifact—perceiving private and/or pro-societal interpretations that they feel are, on net, desirable from their own perspective and fitting in with their self-concept. An assessment is the actor's overall judgment of the artifact, divided into two components: private assessment (how the artifact might benefit the actor), and societal assessment (how the artifact might benefit other actors or society). The actor's overall assessment may be based only on one component, or some combination of both. An assessment is informed by one or more interpretation, which is a more specific judgment relating to a particular functional or societal benefits (or dis-benefits) of the artifact—such as perceived fuel savings or reduced greenhouse gas emissions.

At a given point in time, an actor's interpretations relating to the artifact may be completely non-existent, flexible, or stable. Interpretations are non-existent if the actor is unaware of the artifact's existence. Once aware, the actor typically starts to form some interpretations of what benefits (or dis-benefits) the artifact might offer. Interpretations remain flexible when the actor has little information about and experience with the artifact—they may be unsure of what the artifact offers, or uncertain if promised benefits will be delivered or what costs may be incurred. The actor's interpretations may become stable with increased information, experience or a convergence of interpretations among relevant social groups. If an actor forms a stable, positive

assessment of the artifact, subject to the contextual factors noted above they may form a purchase intention, and perhaps eventually purchase it.

The primary driver of the actor's assessment is their self-concept relating to their lifestyle practices and trajectory. Thus, assessment is not likely to follow the rational, deliberative process represented by the rational choice model—unless, but perhaps not even if, the actor conceptualizes himself as a rational, deliberative person. The actor's self-concept and lifestyle shape what aspects of the artifact they perceive to be important, thus shaping their interpretations and assessment of the artifact. Their overall assessment is positive if the artifact and its interpretations are perceived to align with their self-concept and perceived lifestyle trajectory—even if the interpretations are based on inaccurate or ill-formed information. At the same time, interpretation and assessment processes reflexively influence the actor's self-concept and lifestyle trajectory. In short, the actor's self-concept is itself dynamic and open to influence.

To identify contexts in which an actor's self-concept is more subject to change, RLI employs the notion of lifestyle liminality (Turner, 1969). An actor is in a liminal state if their self-concept is ambiguous, in a state of transition, and/or open to change. Such an actor is not firmly committed to a well-defined set of lifestyle practices. Liminality may be associated with numerous factors, such as: the actor's life stage; their commitments and responsibilities; their access to resources such as time and money; the degree of routinization of their lifestyle practices, e.g. work time and location; and access to a diversity of values and lifestyle practices through interactions with a diverse social network. An actor's self concept is relatively stable if they are committed to a well-defined set of lifestyle practices. Liminality can vary across actors and over time for a particular actor.

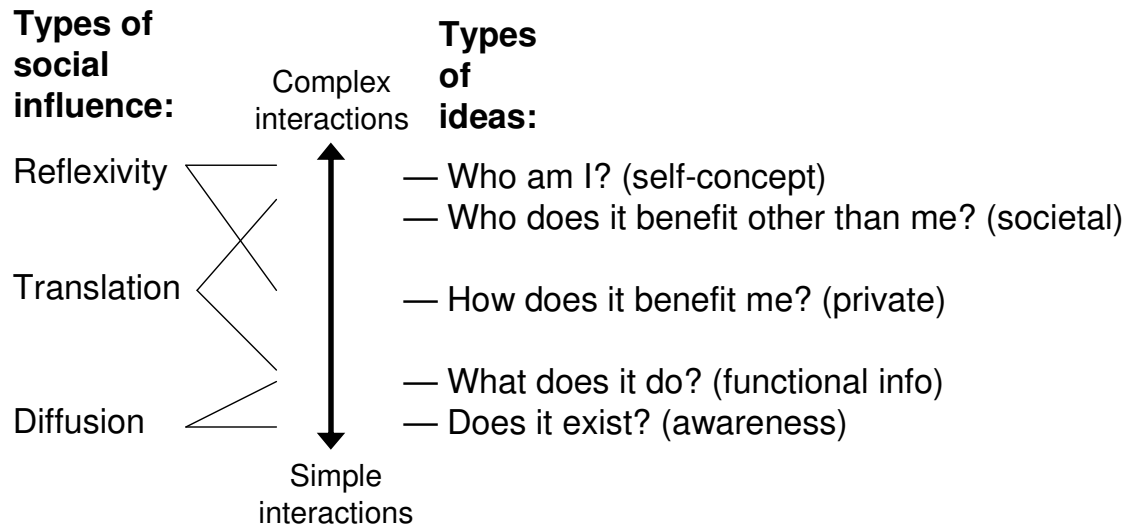
#### **4.4 Driving adoption: Layers of social influence**

RLI describes assessment and adoption according to four basic layers. Building up from the bottom, those layers are functional awareness, artifact assessment, self-concept, and behavior, e.g. purchase. It is the visible outcome that captures the attention of most behavior researchers, but a focus only on this “surface” neglects the important processes that occur below. The ordering of these layers is depicted according to a tendency observed among primary participants: the stabilization of lower level (or foundational) processes tends to be required before higher layer processes can take place. For example, a stable assessment can only take place after the actor has first become aware of the artifact and second, translated functional information to form their private or societal interpretations. The actor starts to reflexively relate the artifact to their self-concept as they start to form a stable assessment. Finally, purchase (which was not observable in the present study) tends to occur once the actor somehow establishes that the artifact fits with their self-concept. Despite this ordering, interactions among layers can occur in multiple directions (not just bottom to top or vice versa) and at multiple points in time.

Processes of social influence tend to follow different patterns at each layer of RLI. Diffusion, translation and reflexivity offer complementary explanations, and RLI borrows concepts from each perspective and redefines each process. Figure 1 conceptualizes how social interactions regarding the different attributes of an innovation may fall onto a continuum representing the



complexity of interactions. Some types of information are simple and static and their flow is better explained as diffusion, such as awareness knowledge. Awareness knowledge flows in one direction (the sender does again become aware of the artifact) and is not significantly altered as it is passed among individuals. Diffusion also applies to simple functional information about the artifact, such as what it does. RLI defines processes of *diffusion* as occurring when such simple information regarding the artifact diffuses uni-directionally within and between social groups; the information changes little with each communication. Diffusion can also occur at the assessment layer, such as when the actor simply assimilates interpretations from another actors' assessment.

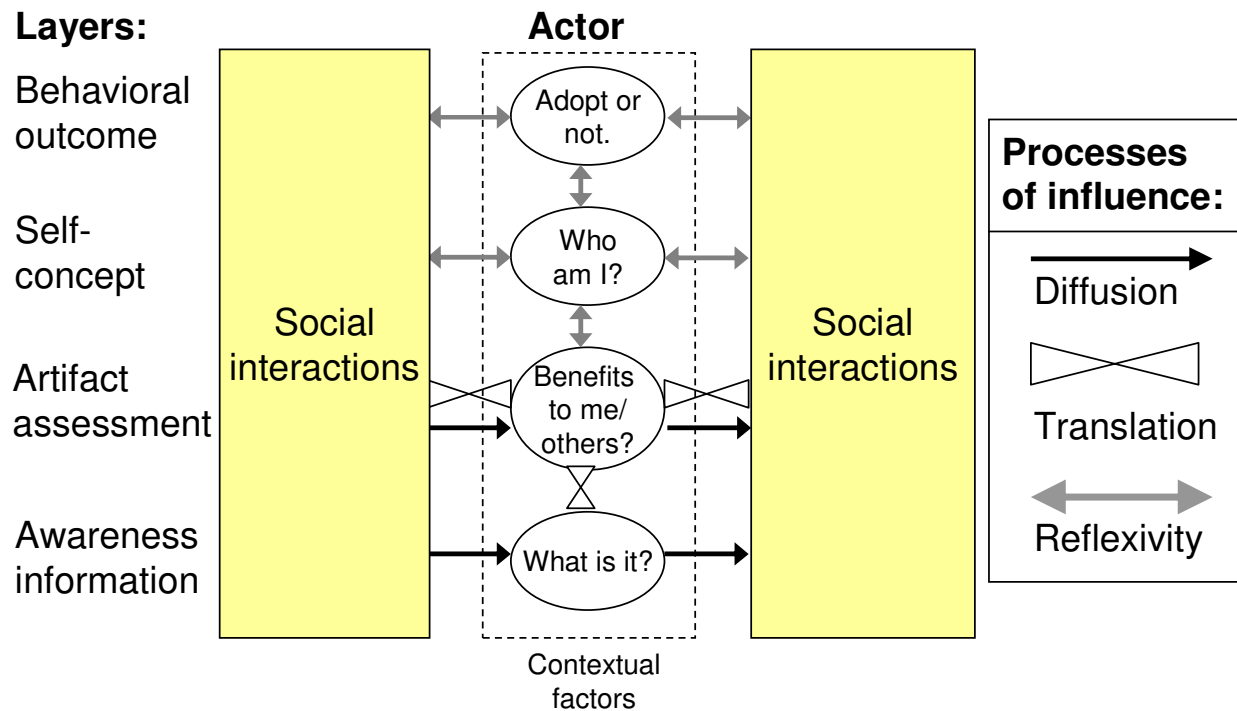


**FIGURE 1 The continuum of interaction complexity**

Figure 2 depicts processes of social influence as they relate to the four layers identified above. The flow of information relating to the actor's interpretations and assessment is characterized as *translation*—the interaction influences the actor's assessment of the artifact within the actor's unique context of experience and self-concept. The content and presentation of the information and how it is perceived can change substantially with each communication, and information and interpretations may be translated in multiple directions during a social interaction. Further, interactions with relevant social groups can influence a given layer through *direct* translation, i.e. the content of the interaction directly addresses the assessment layer, or through *indirect* translation, e.g. the interaction content is diffused to the awareness layer, but the actor translates this functional information into their unique assessment.

Social influence at the self-concept layer constitutes *reflexivity*—assessment, intention to adopt and purchase are driven by the actor's project of the self, and the actor reflexively derives and develops interpretations of how different practices fit into their self-concept and how the self-concept itself might change. Direct reflexivity occurs when the content of an interaction addresses the actor's self-concept, such as two car buyers talking about whether they are motivated by financial savings (private values) or saving the environment (societal values). Indirect reflexivity is when an actor's self-concept is influenced by content addressing other layers, such as if a car buyers' friend's comment that PHEVs are a great way to reduce GHGs

(societal assessment) stimulates the car buyer to consider becoming a person that is more engaged in pro-environmental practices (self-concept). Reflexivity is by definition dynamic, multi-directional and iterative, where self-concept may both influence and be influenced by the actor's artifact assessment and purchase behavior. For instance, if the actor identifies with an environmentalist self-concept, they may purchase an artifact they associate with helping the environment; by purchasing the artifact, they reinforce their self-concept of being an environmentalist.



**FIGURE 2 The basic processes of social influence**

The RLI framework accounts for the three empirical discoveries related to a household's consideration of pro-societal values within the PHEV demonstration, as identified in Section 3:

1. Basic functional understanding is required before a more sophisticated private and/or societal assessment can be made (thus, awareness is layer 1).
2. Pro-societal support within the actor's social network can occur through translation at the assessment and self-concept layers (layers 2 and 3).
3. An actor with a primarily private self-concept must be in a state of lifestyle liminality in order to consider developing a pro-societal self-concept (layer 4).

In RLI depictions below (Figures 3 and 4), liminality is represented at a given state of time by a dotted oval, and stability is represented by a solid oval. Similarly, a dotted oval at the private or societal assessment layers indicates the assessment is flexible, and stability is represented by a solid oval.

## 5. APPLYING THE RLI FRAMEWORK

To illustrate the use of the RLI framework in representing processes of social influence and the development of consumer perceptions and values, this section applies RLI to two of the social networks observed in the PHEV demonstration project (Axsen, 2010): the Noels' as a household with a stable, private self-concept; and the Forts as a household that shifts their values in favor of a pro-societal self-concept over the course of their PHEV trial. (All names are pseudonyms).

### 5.1 The Noels: Stable, private self-concept

A simplification of Rupert and Amy Noels' PHEV experience is depicted in Figure 3. In the beginning of their PHEV trial ( $t = 1$ ), the Noels learned about the PHEV's existence and its basic functions from researchers. Upon learning that the PHEV could reduce gas use, the Noels' initially (indirectly) translated this information into their private assessment of saving money, which was implicitly linked to their fairly stable self-concept of being a family-oriented household. By the end of their PHEV trial ( $t = 2$ ), the Noels' private assessment had been influenced through several social interactions. When Amy Noel's Uncle stated that the PHEV could help reduce trips to the gas station, she assimilated his interpretation into her own private assessment (a direct translation). Also, by driving their PHEV with their three children as passengers, the Noels learned that although such a vehicle was fun for the kids, the Prius was too small for their family—a PHEV for them would need to be larger. These private interpretations are indirectly reflexively linked with (and in this case reinforced) the Noels' self-concept of being a family-oriented household.

None of the Noels' friends, family or other alters referred to societal aspects of the PHEV, and this layer remained irrelevant to the Noels throughout their PHEV trial. From their assessment, the Noels form an intention to purchase such a vehicle subject to conditions that align with their family-oriented self-concept. Because this study did not observe PHEV adoption, it is unknown if the Noels will turn their pro-PHEV intention into purchase at some point in the future. Ultimately, such a purchase would only occur with an alignment between the conditions of their behavioral intention (which may still change over time), and the contextual factors such as model availability, purchase price, and their household income.

The Noels diffused information about the PHEV to some friends, family and other alters, including Rupert Noels' manager, John, who served as secondary participant. From Rupert, John learned that PHEVs exist and could reduce gas spending, and, contrary to his initial perceptions, that electric-drive vehicles could have powerful acceleration. John indirectly translated this information to inform his private assessment of the PHEV, though his already positive societal assessment of electric-drive remained unchanged. His private and societal assessments are reflexively linked with his stable self-concept of being a smart consumer, as well as his intention to purchase a PHEV if it offers fuel economy he deems to be satisfactory.

### 5.2 The Forts: Opening to a pro-societal self-concept

Figure 4 depicts the Fort's PHEV experience. After learning about the PHEV from researchers, the Forts were initially unsure if such a car could save them money, would be perceived by

others as a “weenie car” and was safe enough for them to drive regularly (flexible private interpretations). They were also unsure if the PHEV had environmental benefits (flexible societal interpretations) that would link to their recent experimentation with environmental lifestyle practices (lifestyle liminality), such as reducing home energy and water use. By the end of their trial, after driving the PHEV as a family and receiving pro-societal support in their social network, the Forts reduced their private concerns of safety and image and solidified their commitment to environmental values.

The Forts also diffused functional and assessment information to alters like their friend Lindsey. Lindsey learned functional information about the PHEV from Selena Fort, such as how it achieved impressive fuel economy and was easy to recharge. Lindsey linked these benefits to her stable self-concept of being a family-oriented single parent who was concerned about saving money and making smart financial decisions. In this social interaction, influence was unidirectional; Lindsey did not exert social influence on the Forts’ assessment of the PHEV (as reported by the Forts).

These examples illuminate the important, though typically indirect, roles that diffusion, translation and reflexivity can play in PHEV assessment, self-concept, purchase intention and ultimately, though not observable in this empirical study, purchase behavior. The RLI framework accounts for heterogeneity among instances of social influence: information and interactions can range from simple to highly complex, the flow can be one-way or multidirectional, and the process can directly or indirectly impact awareness, functional understanding, assessment, self-concept, behavioral intention and purchase behavior. In these examples, direct influence is observed at layers of awareness, functional understanding, private and societal assessment and self-concept.

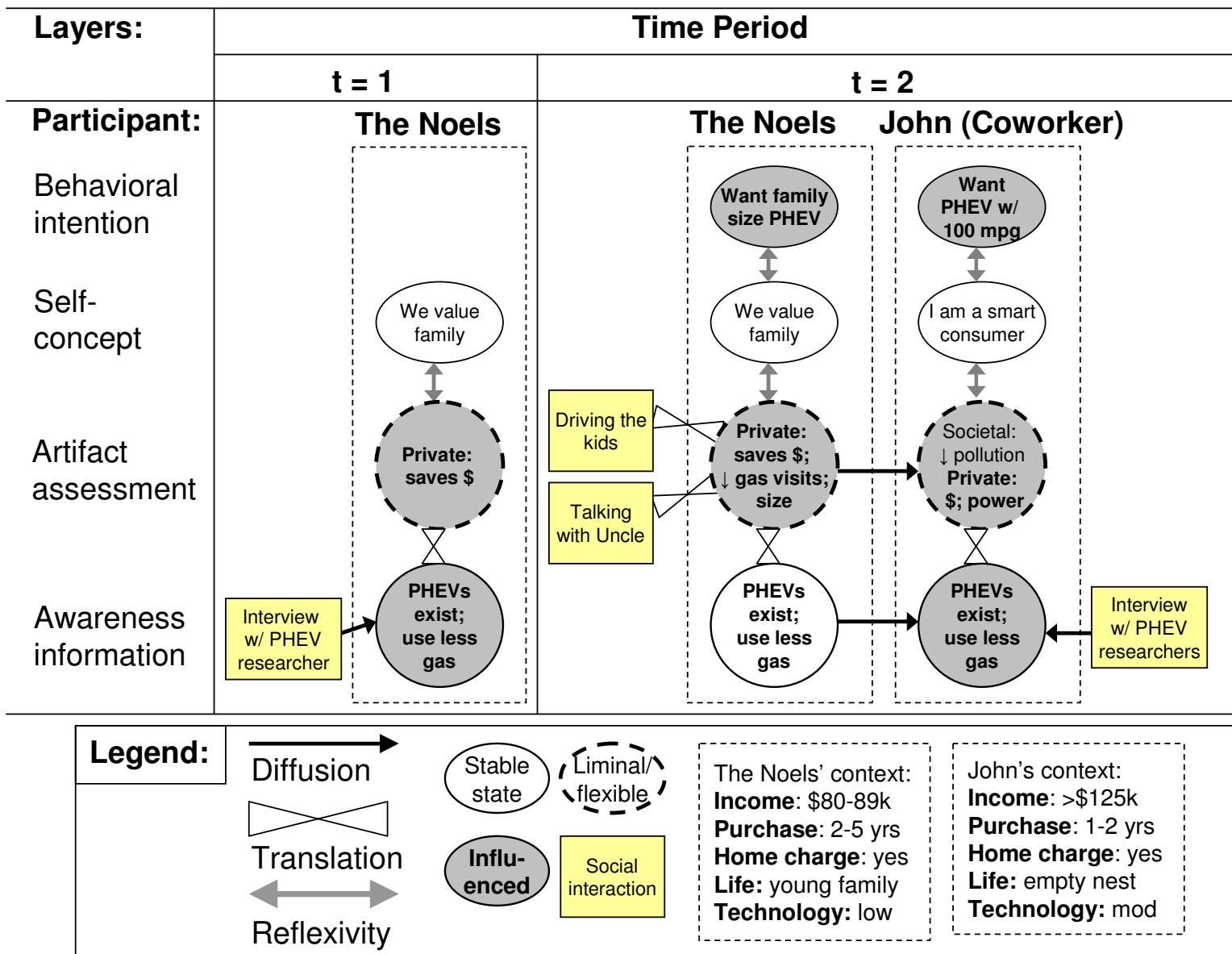


FIGURE 3 The Noels' RLI framework

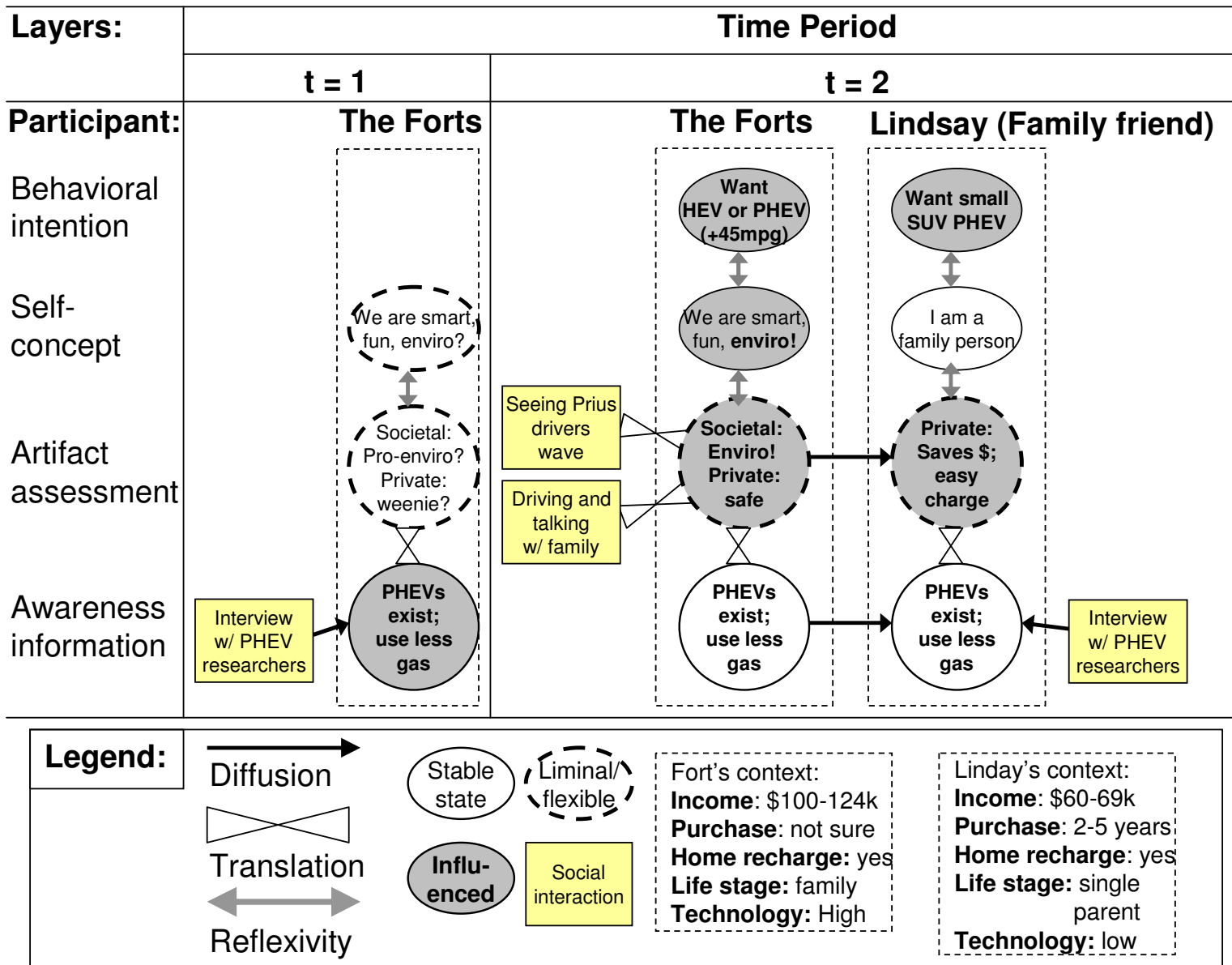


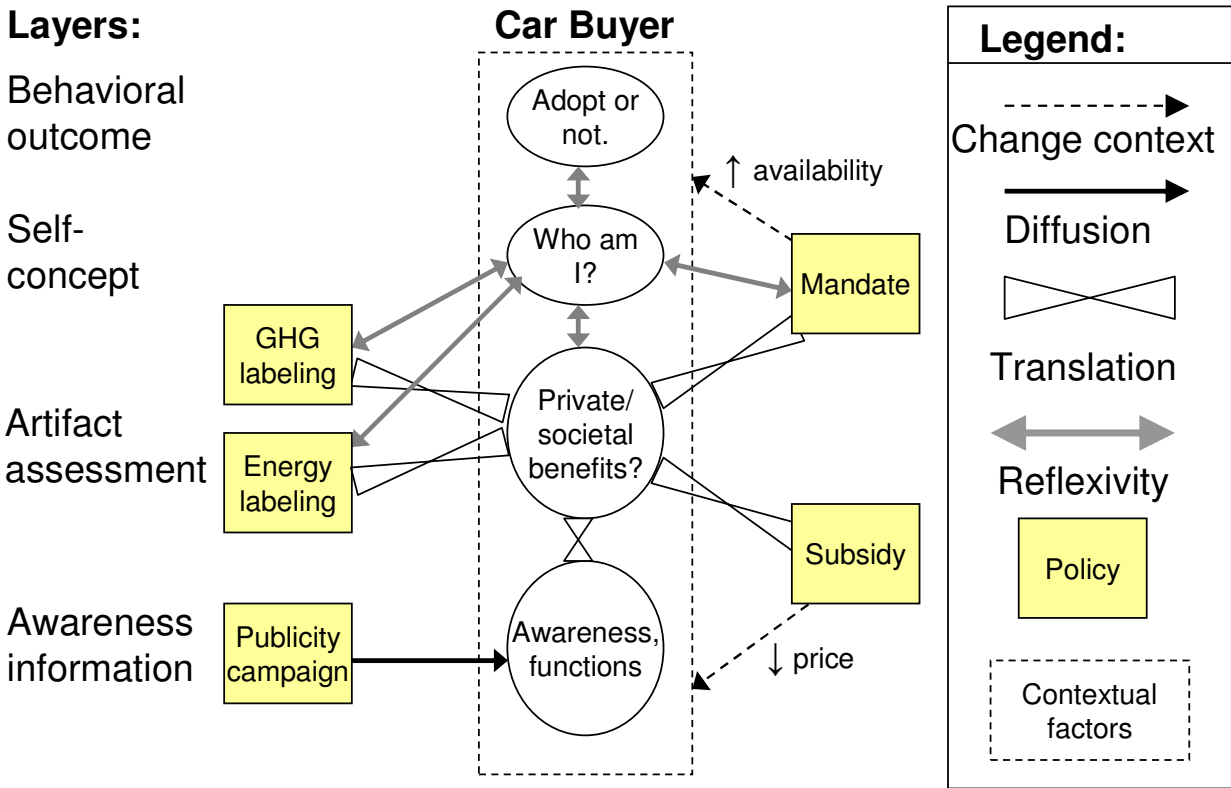
FIGURE 4 The Forts' RLI framework

## 6. POLICY IMPLICATIONS

RLI can be applied beyond the scope of the PHEV demonstration project, such as policy analysis. The rational choice model of behavior suggests only two levers for policymakers to influence consumer behavior: changing cost (via financial incentives or disincentives) and providing functional information about the product or behavior. In contrast, this study observed social influence change households' values and expressions of possible future behaviors. RLI views the government as an actor, and implemented policies are a form of social interaction between the government and car buyers. Careful consideration of how different policies and types of information and experiences influence car buyers can help policymakers to better design policy, predict its effects, and measure its impacts. In particular, policymakers might consider the differences between the processes of diffusion, translation and reflexivity.

Several policy examples are depicted in Figure 5. A publicity campaign can attempt to intentionally diffuse, or disseminate, information about PHEVs in efforts to achieve societal goals, such as awareness of the technology and functional information about what it does. Policymakers might also disseminate this information through labeling standards, or energy information websites. Successful policy-driven diffusion may help to establish the awareness and functional understanding layers that are necessary for an actor to further assess and value the technology. However, diffusion alone does not necessarily impact the actor's assessment, self-concept, or purchase behavior.

Translation describes a more sophisticated form of social influence where the actor develops a more refined and stable understanding of the PHEV, how it might benefit them personally, if it might benefit society, and (through reflexivity) if they should care if it benefits society. What policies might be coordinated with a simple publicity campaign to help actors and social groups translate information? Product labeling serves as one type of translation—where policymakers frame the PHEV according to particular benefits, such as cost savings (a private benefit) or GHG emissions (a societal benefit). Other policies may also be indirectly (or unintentionally) translated by actors. While a subsidy directly affects the price of a PHEV (a contextual factor in RLI), it may also help diffuse awareness about the technology, and also may be translated through considerations of why the subsidy is being offered, e.g. that PHEVs are good for society, PHEVs are ineffective technologies that need government help, or the government is wasting tax dollars. Further, a government mandate, such as the Zero-Emissions Vehicle (ZEV) mandate, can also reflexively contribute to social discourse about what kind of vehicles consumers should desire or at least what attributes of vehicles should be pertinent to consumers' self concepts, e.g., whether consumers should value private and societal benefits (Brown, 2001). In short, policymakers need to consider the variety of impacts of a given policy, including the differing processes of social influence, and RLI provides a useful framework to do so.



**FIGURE 5 Policy levers for social influence**

## 7. DISCUSSION AND HYPOTHESES

To an extent, the RLI framework accounts for each of the components Jackson (2005) highlights as integral for a useful model, including motivations, value, context and social influence. An actor’s motivations stem from their self-concept—their desire to construct a meaningful narrative of their life experiences that represents who they are and where they are going. This self-concept is reflexively linked to how the actor frames their attitudes towards the purchase and use of a new artifact, as well as other potential lifestyle practices they may or may not adopt. Included is how the actor considers and prioritizes private and societal benefits of the artifacts. Social influence is represented as processes that help actors to learn about the artifact and its functions, assess how it benefits them and society, test different lifestyle practices, and develop their own self-concepts. Assessment and intention are implemented into action only when aligned with contextual factors, such as market availability, pricing and government support, and personal capabilities, such as household income and access to the artifact. Finally, habit is represented as a tendency towards the status quo—the actor tends to engage in practices that align with their self-concept. If self-concept is stable, practices established as well-aligned with this concept may become relatively automatic. However, when in a state of lifestyle liminality, the actor may break old habits and consciously experiment with new practices as trials of a new lifestyle.

The primary contribution of the RLI framework is the orientation and structuring of important concepts from different research perspectives on social influence into a single framework. Here we have applied RLI to qualitative research in a descriptive manner. RLI could also be used to



guide quantitative research, and could feasibly be helpful in predictive applications. For instance, the hypotheses articulated below could be tested with statistical models in a large-scale, representative sample of car buyers. Hypotheses flowing from RLI may include:

1. Actors' self-concept can change, including their valuation of private versus pro-societal benefits.
2. Actors with a primarily private self-concept are more likely to value the pro-societal benefits of a new artifact if the actor:
  - a. has a basic functional understanding of the artifact,
  - b. is in a state of lifestyle liminality, and/or
  - c. finds support for pro-societal values among their relevant social system.
3. Processes of direct translation are more likely to influence adoption behavior than processes of diffusion and/or indirect translation.
4. In a given social interaction, direct translation is more likely to occur for the actor than diffusion or indirect translation if:
  - a. the alter is socially close,
  - b. the alter has previous experience with the artifact,
  - c. the interaction takes place over multiple social episodes, and/or
  - d. information exchange and/or influence are multidirectional.
5. Direct reflexivity occurs less frequently than other forms of social influence, but when it does occur, it is more likely to influence the actors' vehicle assessment and purchase behavior than other processes of social influence.

RLI is equally valid as a framework to guide the design of qualitative research projects and the construction of participant narratives. In fact, the authors hope that RLI will inspire transportation behavior researchers to more actively consider the strengths of qualitative research approaches and instruments to observe the complexities of consumer behavior.

## **8. CONCLUSION**

To create an integrative behavioral model to represent processes of social influence and vehicle purchase behavior, this paper draws from a literature review and empirical observations of PHEV demonstration participants. The result—the reflexive layers of influence (RLI) framework—proves useful for describing illustrative examples, and considering the design and implementation of transportation energy policy relating to consumer behavior. Future research should further test this model through application to alternative contexts, and can also use the insights and hypotheses gleaned from this framework to guide both quantitative and qualitative research design. Policymakers may also want to heed insights that RLI holds for policy design, particularly to effectively leverage processes of social influence in efforts to align consumer behavior with societal goals.

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