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Defining the stimulus in stimulus–response interventions: On the need to embrace theory and organism in stimulus–organism–response

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Abstract

We comment on a proposal in the target article that draws on “behaviorism” for developing interventions geared at attenuating negative consumer behaviors. One interpretation of this proposal emphasizes the influence of stimuli (S) on responses (R) and de-emphasizes intervening mental processes. We contrast this S–R perspective with an S–O–R perspective that embraces O, the organism (in our context, the consumer) and in doing so attempts to explain and then leverage S–R relations. We discuss in detail that without an organism- and theory-centered perspective of S–R relations, it is difficult to identify relevant stimuli and predict patterns of behavior in new contexts. We illustrate in more depth using Janiszewski and Laran’s example of aiding an individual suffering from depression how this theory- and organism-centered perspective can improve possible intervention strategies.

KEYWORDS

implicit learning and memory

1 | INTRODUCTION

In their inspiring target article, Janiszewski and Laran (2024; henceforth J&L) break a lance for taking a more behaviorist perspective on consumer research in the service of developing real-world interventions capable of addressing negative consumer behaviors. Building on J&L, we reflect on how to harness the potential of the behaviorist perspective to achieve this objective. Like J&L, we see great value in the broader behaviorist perspective and in the prodigious nomological and methodological insights behaviorist research has produced. The behaviorists’ focus on actual observable behavior and the patterns of its acquisition and extinction as a result of environmental pressures and adaptations (i.e., “learning”) have always implied a view of consumers and society at large as extremely “malleable.” As J&L creatively exemplify in at least five domains, behaviorist methods and insights should thus be eminently suitable sources of inspiration for governmental and social programs of change. We find it important to

reiterate from J&L some major advantages of their perspective: a focus on how stimuli (S) relate to behaviors (R), a focus on *dynamic* and *observable* behaviors, a focus of consumption itself, and as a result, a promise of greater applicability of consumer research. Yet, some characteristics of behaviorism that J&L view as advantageous, we see in a more critical light, notably the idea of not recognizing innate structures that allow organisms to learn and the idea of not being constrained by theory (Janiszewski & Laran, 2024, p. 16). We will explain why we believe that a perspective that emphasizes innate structures and is informed by theory would be more effective than one that does not. Such a perspective is consistent with modern conditioning research. Whether one would like to call this research behaviorist is a semantic issue.

Our reservations are rooted not in what J&L’s behaviorist perspective emphasizes but rather in what it de-emphasizes: for one, individual consumers (i.e., the *organism*), their *cognitions and motivations* and their *heterogeneity* (e.g., individual differences); for another,



explanations of behavior in terms of general cause–effect relations (Calder et al., 2021). Our first two sections will discuss that emphasizing these two aspects can enrich an understanding of stimulus–response relationships. In our final section, we will outline what in our perspective is currently *still* the most pressing concern for the behaviorist manifesto to reach its full potential: More than 70 years after its conception, the quote by Stevens (1951, cited in Terrace, 2010) that “there is only one problem in psychology and that is the definition of the stimulus” remains extremely relevant. As we will argue, for the behaviorist manifesto to progress, tackling this problem head on is crucial.

2 | THE NEED TO CONSIDER THE “CONSUMER” IN (NEGATIVE) CONSUMER BEHAVIORS

According to J&L (p. 14),

Behaviorism is, at its core, an interest in how the environment encourages, enables, sustains, and extinguishes behavior, without emphasis on intervening mental processes. That is, a behaviorist perspective motivates research questions related to how the environment influence behaviors, even if the research is not purely behaviorist.

This quote could be read as favoring an S–R approach to an S–O–R approach (O = organism; Woodworth, 1924, cited in Terrace, 2010). It could alternatively be read as examining O only if in the service of understanding the influence of S on R. Next, we discuss challenges when disregarding O and conclude that embracing O will be more effective.

First, without considering O, it is often unclear or even undefined what S is, because people never react to S itself, but always to their perception, internal representation, and interpretation of S. Since the days of the Gestalt psychologists, we know that even basic, “objective” features like the size of S are perceptually determined in relation to other Ss, a phenomenon that applies across species (Parrish et al., 2015). For example, an otherwise identical discount (e.g., \$10 off) will be perceived as larger (and have a greater behavioral effect) on a lower priced than on a higher priced item (cf. Kahneman & Tversky, 1984). Moreover, the groundbreaking work of Kahneman and Tversky (1979) established that decision-makers’ internal reference points, too, influence perceptions that in turn powerfully impact decisions (i.e., Rs), in this case whether to choose a risky or certain option.

Next, without consideration of O, it can also be unclear what R is. Imagine, for example, a researcher who is trying to leverage behaviorist insights to tackle overconsumption. From a strict behaviorist perspective, consumption can only be defined observationally as contact with the reinforcer. But if we focused only on that contact, it would be difficult to understand overconsumption. In the first place,

because what classifies as “overconsumption” cannot be determined purely from external observation but is itself entirely determined in reference to O, the consumer’s physiological and psychological status, their motivations, emotions, and goals. Second, because considering O greatly helps identifying which Ss and Rs may be relevant to consumption, even if they do not involve direct contact with the reinforcer. Contact with predictive cues (e.g., smell and packaging) during preconsumption elicits strong motivation to seek a reward (e.g., food), contributing to overconsumption. When after a main dish, a person is exposed to a fattening desert as a new cue, we need to consider both the “after consumption of the main dish” and the “preconsumption of the desert” stages. Again, the distinction lies in the perspective of O, and the involvement of the internal dopamine motive system at both stages can help delineate these stages and the influence of cues on consumption (Volkow et al., 2017). Ordinarily, the reward value of food reduces during consumption, but for obese individuals, this may not be the case (moderation by O). As another preconsumption event, we need to consider O’s motivation to seek other (i.e., nonfood) rewards. If an individual has chronically reduced motivation to seek alternate rewards, this will contribute to a compulsive preoccupation with the focal reward (ibid).

The food example illustrates that even the concept of “reward,” so central to behaviorism, is often not defined without considering O. For one, because reward level depends on need/motivational state of O (Wise, 2004). For another, what may be a reward or punishment to one person is not to another, particularly in a social context. Consider a nudging intervention based on conveying that the to-be-nudged behavior (R) is the social norm. Schultz et al. (2007) “rewarded” consumers by giving them feedback that they consumed less electricity than their neighbors’ average consumption (i.e., the norm). Surprisingly, consumers now increased their electricity consumption, moving closer to the norm, despite the fact that their previously low use had been “reinforced.” However, also providing them with a signal (another S) that symbolized “better than the norm is good” eliminated this unwanted effect. When people surpass the norm, they may interpret this as a reward, but they need not. Only by embracing O will researchers be able to identify outcomes that consumers consider rewarding.

J&L point to research in behavioral economics and stimulus-based nudges that focuses on alterations to the choice environment as good examples of research building on behaviorist principles to answer important research and societal questions (p. 15). However, this example also cautions us that research approaches that are purely based on enumerating environmental modifications can be ineffective. A recent meta-analysis indicates that the “overall effect” of nudges (i.e., one could interpret this as their basic S–R effectiveness) is weak to nonexistent in most domains after adjusting for publication bias, while the effect of individual nudges is characterized by great heterogeneity (Maier et al., 2022). This is not surprising from the perspective that stimulus, behavior, and reward are all defined strongly in relation to “O,” such that aggregate S–R relations that do not take these dependencies into account show few consistent patterns.



3 | THE NEED FOR CAUSAL EXPLANATIONS OF S–R RELATIONS

J&L alert us that studying cognitive mechanisms for their own sake, although very valuable, can detract if the objective is discovering impactful S–R causal relations. On the other hand, if we understand why an S we observed influenced an R we observed, that is, if we can explain the observed causation, we will have a better chance of developing an effective intervention. In the spirit of J&L's perspective, we note that what counts in the peer review process as “mechanism” can have little explanatory value (Calder et al., 2021). Thus, our argument is in favor of explanatory value, not in favor of any mechanistic notion irrespective of its explanatory value. Explaining S–R relations does not have to detract a researcher from discovering or implementing impactful S–R relations, to the contrary. Even strict behaviorists like Skinner sought explanations, albeit not cognitive ones, but instead “rules” in the structure of Ss and Rs that would be universally applicable. Even though their experiments were conducted in the laboratory (and often with animals), which nowadays would be viewed as low in ecological validity, it is their rules that allowed them to make predictions for field settings in humans. The emphasis on ecological validity that J&L identify as one of behaviorism's strengths is grounded in the conceptual work of developing abstractions that go beyond the empirical observations, not in applied experimental settings.

When emphasizing S–R relations nowadays, we agree with J&L that we should not put on theoretical handcuffs. We should not be constrained to explain an observation only in terms of a particular type of theory, and indeed, explanations do not need to be cognitive. Yet, explanations provide a different kind of constraint, one that is welcome in developing interventions. They reduce our flexibility in interpreting any stimulus as the cause for the problematic behavior, in proposing any intervention as the cure. At its simplest level, we view an explanation as a theoretical cause–effect relation that is more abstract (or universal) than any of the observed cause–effect relations it explains and, that because of its abstraction, can be applied to many different observed situations and behaviors, also ones never observed before (Calder et al., 2021). Research that solely documents observed effects without explanation, such as “if observed-S, then observed-R,” runs into the problem of induction, which is also a problem for application. An observation at time 1 may not replicate at time 2, simply because the two situations may differ in some relevant aspect unbeknown to the researcher. This makes predictions difficult for situations that have never been encountered before. A theory that involves explanations for observed cause–effect relations allows making such predictions by assessing whether the explanatory cause postulated by the theory is present in the new situation (Calder et al., 2021; Pearl, 2021).

Finally, it's worth noting that the “reward” concept itself is not just dependent on factors related to “O” as outlined above but also requires theoretical specification, which is challenging to produce from a strictly behaviorist perspective. Merely describing it in S–R terms, as “an outcome that increases responding to a particular stimulus” is circular. Could pleasure (an internal R) serve as a proxy? The

following example illustrates that this is problematic too. An S–R analysis intended to fight obesity would suggest that we should find a way to reduce the pleasure that follows after eating fattening foods and/or increase the pleasure that follows after eating nonfattening foods. Although this sounds extremely plausible, pleasure does not seem to be a major cause of obesity, but instead, unconscious signals from the gut (again, an O) may be the most powerful reinforcing signals (de Araujo et al., 2020). Further, if anything, paying attention to pleasure during eating may reduce the amounts of food eaten (Cornil & Chandon, 2016; Hege et al., 2018). Inquiring for the meaning of the reward construct also helps in developing interventions.

4 | THE CHALLENGE TO DEFINE THE STIMULUS

As J&L illustrate in the second part of their article, the behaviorist perspective can bring great value by functionally analyzing settings (ranging from consumption occasions to grand societal problems) in terms of their S–R–O[±] components (stimuli, responses, and outcomes). Importantly, while we adhere to J&L's notation, note that the “O” in this schema has now changed meaning. Instead of referring to the “organism” (in S–O–R chains), here, it refers to the “outcome or reward,” which follows the response or behavior (R), and can be positively (O+) or negatively (O–) valenced, henceforth labeled O[±]. J&L identify in five domains how these S–R–O[±] schemas can inspire therapeutic, technological, or societal solutions to problematic consumer behaviors.

Behaviorist research has produced great insights into regularities in the learning and expression of S–R relations. Efforts to improve consumer welfare would be more likely to succeed if we could properly leverage these insights. Yet, the accumulated knowledge can be hard to synthesize and requires careful analysis of any concrete setting in terms of its precise S–R–O[±] components. Consider that we have learned, for example, that sometimes brand cues interact in their predictions of benefits, while sometimes they do not (van Osselaer & Janiszewski, 2001); that sometimes new learning about brand cues interferes with the contents of previous learning, while sometimes it does not (Sweldens et al., 2010); that sometimes conditioned responses extinguish, whereas sometimes they do not (De Houwer et al., 2001); that sometimes consumers can control the effects of brand–reward pairings, whereas sometimes they cannot (Hütter & Sweldens, 2018); that sometimes later-learned attributes have more impact on choice, whereas sometimes they do not (Cunha & Laran, 2009); and so forth.

All these examples of learning regularities were established in lab environments where stimuli, responses, and rewards could be carefully identified, manipulated, and controlled. Predicting under which specific observable conditions, that is, when each of these diverging response patterns will emerge, requires theoretical abstraction. The S–R–O[±] schemas of the negative consumer behaviors provided by J&L, conversely, appear extraordinarily flexible and seemingly capable of incorporating any conceivable mental or physical event in any



position. This flexibility may be consistent with J&L's recommendation to cast off theoretical handcuffs and certainly has beneficial consequences. It promotes a broad search for relevant factors and J&L's decidedly post-behaviorist flexibility appears to embrace internal unobservable states (e.g., "loneliness") as relevant factors, which we applaud. However, this flexibility comes at a cost as well: If situation components are fluid or poorly defined in terms of their S-R-O[±] status, it will be challenging to properly leverage behaviorist theories and insights.

Consider by means of example the concept of "loneliness" which featured in several negative consumer behaviors discussed by J&L (p. 24–29). We conceive of loneliness as an emotional state, that is, an attribute of O. On p. 24, loneliness functions as "CS that hypermotivates materialistic purchases." On p. 26, loneliness is mentioned as a US when we "consider a person who is temporarily experiencing more negative events (US) in their lives (e.g., negative emotions, stress, fatigue, loneliness) than is typical." Finally, on p. 27, loneliness functions as a UR in a series of examples of CS → US → UR chains (in this case, apartment → lack of social interaction → loneliness). This flexibility in assigning the same term (here an emotion) to different behavioristic concepts (CS, US, UR; i.e., conditioned response, unconditioned stimulus, unconditioned response) is common throughout the examples provided by J&L. There is nothing wrong with this in principle. However, we need some guidance as to when which assignment is appropriate.

Even if we do not quite go along with Stevens' (1951) provocative claim that defining the stimulus is the only problem in psychology, it seems clear that for leveraging psychological theories for society, psychology needs to succeed in identifying for a particular situation what it is that a person reacts to and in defining the stimulus in this sense. CS, US, and O[±] are not sufficient. In a forthcoming synthesis of the consumer associative learning literature called the "Trinity Model of Brand Associations," du Plessis et al. (2024) argue that associations between CSs (e.g., cues such as brands) and USs develop very differently and have different retention rates and behavioral consequences, depending on whether the US is processed as a "predicted experience or outcome" (S-O[±]),¹ a "mental reference or stimulus" (S-S), or a "physiological reaction, emotion, or response" (S-R). S-O[±] associative learning appears to be governed mostly by System 2 conditions and S-R learning by System 1 conditions, and S-S learning is characterized by a mix of these features on an underlying continuum of automaticity. It is crucial to realize though that when a single US becomes associated to a CS, the US can be processed as an outcome (O[±]), mental reference (S), or response (R), depending on the context. Thus, the model proposes three classes of CS-US associations.

Let us illustrate why identifying whether a particular CS became associated with a particular US in which of these three ways is important in the context of J&L's example of a consumer who is struggling with loneliness and depression (p. 28). J&L propose two behaviorist-inspired ways to help such an individual. One is finding and eliminating stimuli (CSs) from a person's environment (e.g., things in their apartment) that cause negative responses (CRs). The other is to extinguish negative CS-US → UR relationships. We agree that these are

promising interventions that follow from an S-R perspective. However, we also believe that bringing the explanatory constructs from the Trinity model to bear would allow us to improve the effectiveness of these interventions. Let us ask whether each intervention would be equally viable or even when we should favor one to the other. On the basis of well-established learning and memory principles, the Trinity Model by du Plessis et al. (2024) proposes that only S-O[±] associations will naturally extinguish, while S-S associations are very resistant to extinction. Differentiating a CS-US association of type S-O[±] from type S-S thus has explanatory and predictive value for understanding why extinction is sometimes fast and sometimes slow. The classification also allows us to predict for a situation never observed before, whether a particular CS-US association will extinguish.

To show that identifying the type of CS-US association can improve interventions, imagine that at the root of the loneliness and depression lies the recent loss of a romantic partner. The ex-partner is thus a US which is triggering negative emotions (UR). Of course, there will be many elements (CSs) in the individual's home that have become associated with this US via classical and evaluative conditioning processes. Perhaps, the clock in the hallway striking five times (CS₁) was a reliable predictor of the ex-partner (US) coming home. Perhaps, the couch in the living room (CS₂) has become strongly associated with the ex-partner (US) because it was her favorite spot in the house. Yet, while they look ostensibly similar as CS-US relations, the exact nature and role of the US in the learned association is crucial for the to-be-recommended action. In the case of the clock, the CS is associated with an expectation of an event occurring, namely, the partner coming home. Such S-O[±] associations in Trinity Model terms are characterized by high rates of extinction. The aversive responses triggered by the clock striking five times can therefore be expected to extinguish naturally and relatively rapidly over time. The clock, therefore, could stay. The couch, on the other hand, is associated rather with mere thoughts of the ex-partner. These thoughts do not necessarily contain an "expectation" or prediction component of the partner physically appearing. The couch simply reminds of the partner. Such mental associations or references (S-S associations in Trinity Model terms) are much more resistant to extinction. For the sake of the individual's happiness and recovery, it might therefore be more commendable to "eliminate this stimulus from the environment" in the terms of J&L. In sum, based on the learning history of O, we can assign a physical S (couch or clock) to one of two types of CS-US associations, S-S versus S-O[±]. These associations differ in how easily they extinguish when the CS is presented alone. The classification is not inherent in the physicality of the stimulus. It is conceptually and individually determined.

5 | CONCLUSION

Leveraging the insights of behaviorism requires precise classifications of the observable stimuli present in a learning history and problem context. Crucially, we argued that both the perspective of "the organism/consumer" and a theoretical lens are indispensable in

meaningfully defining stimuli. Which role is taken by a stimulus (e.g., whether a US serves as an O[±], an S, or an R in terms of the Trinity Model by du Plessis et al., 2024) is impossible to tell without reference to the consumer's perception and interpretation of it in the learning context. Furthermore, without conceptual categories that meaningfully classify stimuli and responses, it would be impossible to pick from the vast number of possibilities the relevant ones for interventions. In the absence of formal theoretical concepts, a researcher will fall back on intuitive concepts to solve this problem. This is complicated by the fact that, as we illustrated, the same stimulus can serve in different roles in different learning situations. Unfortunately, this implies that identifying the role of a specific stimulus will often be highly context-dependent—and thus, the ability to generate wide-ranging behavioral predictions regarding the effectiveness of environmental interventions or nudges will be limited. At the same time, these realizations are crucial to understand why behavioral or environmental interventions will often fail without sufficient attention to the context, the individual, or to the relevant theory indeed (Maier et al., 2022).

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ENDNOTE

¹ du Plessis et al. use the letter O, not O[±].

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