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Evaluative Conditioning has a Vexing Demand Problem

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ABSTRACT

Attitude research has long been concerned with the potential influence of demand characteristics in evaluative conditioning effects. Here, we argue that this concern remains justified and cannot be readily dismissed. This is supported by two observations. First, strategies used to rule out a demand account of evaluative conditioning effects have, if anything, supported rather than rejected it. Second, as we illustrate by discussing three recent studies that revisited this question, this investigation is empirically challenging. In the general discussion, we argue that a better understanding of demand effects can advance theorization and practice, and we discuss criteria that may help delineate demand from propositional and memory accounts of evaluative conditioning.

1 | Introduction

Imagine a new medical treatment. It seems effective: patients report less symptoms after taking it. Yet, a few years later, you learn that participants who took part in clinical trials knew they were treated, and knew which treatment effects to expect. You also learn that participants who did not know they were treated showed no treatment effect. Next, you learn that further studies established a treatment effect in participants who are merely told that they will be taking the treatment. Last but not least, you learn that a large proportion of treated participants report that they faked the treatment effect. How confident are you now about the existence of a treatment effect?

Throughout this article, we will see that evaluative conditioning (EC) research is plagued with similar issues. Consistent with this observation, we contend that EC researchers should be concerned about potential demand artifacts in EC research and that these artifacts cannot be easily ruled out. In Section 2, we briefly discuss EC effects. In Section 3, we summarize a recent framework for experiences elicited by demand characteristics (Corneille and Lush 2023). In Section 4, we argue that three approaches deemed relevant for probing demand artifacts in EC

have, if anything, supported rather than rejected their influence. In Section 5, we discuss three recent articles illustrating challenges in designing diagnostic tests for demand effects. In the General Discussion, we summarize key conclusions discussed in this article, and the delineation between a demand account and both propositional and memory accounts of EC.

2 | Evaluative Conditioning

EC effects are defined as evaluative changes observed after pairing a conditioned stimulus (CS) with another stimulus of positive (US+) or negative valence (US-; for a recent discussion, see Moran et al. 2023). In a typical EC study, participants are exposed on a computer screen to a sequence of CS-US + pairs (for instance, the image of an affectively neutral ideograph paired with the image of a beautiful scene) and CS-US- pairs (for instance, the image of another affectively neutral ideograph paired with the image of a dental cavity). Typically, each CS-US pair is presented multiple times for relatively long periods of time (i.e., time allowing to attend to and memorize the pairings). After this exposure phase, participants are asked to complete evaluative measures about each of the CSs (i.e., the

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ideographs), this time presented without the affective picture they were previously paired with. EC effects are established when the evaluation of the CSs are more positive following their pairing with positive than negative USs. In a variation of that classic EC procedure, participants evaluate the CSs both before and after their pairing with the USs.

EC is a robust phenomenon that has enjoyed a wealth of interest, particularly in the past three decades, because it builds on a simple association procedure deemed particularly relevant for testing dual-learning models of attitudes. EC remains a very lively research topic that has been covered in several recent literature reviews (Corneille and Stahl 2019; Gawronski and Corneille 2025; Hütter 2022; Moran et al. 2023).

In typical EC procedures, the experimental hypothesis should be obvious to many participants: a more positive impression of the CSs is expected when the CSs are paired with positive than negative USs. And, indeed, research supports the view that participants hold such expectations (Nudler et al. 2024; Van Dessel et al. 2025). Therefore, the question naturally arises: how can we reject a demand account of the EC effect, whereby participants intentionally produce experiences and behaviors consistent with their understanding of these experimental effects?

As discussed in Sections 4 and 5, we believe that an interpretation of EC as caused by demand characteristics cannot be easily dismissed. Before proceeding to that discussion, we briefly present a recent framework discussing how demand characteristics may influence participants' experiences in psychological experiments.

3 | A Framework for Experiences Elicited by Demand Characteristics

Demand effects are experimental artifacts based on participants' understanding of the experimental hypothesis and their intention to produce behaviors or experiences consistent with or oppositional to it. These artifacts create internal and external validity problems (Corneille and Lush 2023; Sharpe and Whelton 2016). First, similar to placebo effects, experimental treatments may operate because of experimental expectations created in the participants, as opposed to other types of mental processes assumed by the experimenter (the internal validity problem). Second, effects may not generalize outside the lab, or even when subtle variations in demand characteristics are implemented within the lab (the external validity problem).

Corneille and Lush (2023) proposed a framework of experiences elicited by demand characteristics that identifies three stages. First, in the course of the experiment, participants may attempt to figure out the effect of interest in the experiment: the experimental hypothesis. They may get the hypothesis right (e.g., they may correctly figure out that CSs should be liked better when paired with positive than negative USs). In this case they are considered hypothesis-aware. Research suggests that participants in EC studies often get it right (Nudler et al. 2024; Van Dessel et al. 2025). They may also get it wrong

(e.g., they may incorrectly figure out that CSs should be liked better when paired with negative than positive USs). In this case they are considered hypothesis-mistaken. Research suggests that in the tested settings only a minority of participants in EC studies are hypothesis-mistaken (Van Dessel et al. 2025). Finally, participants may have no idea what the study is about. In this case, they may be considered naïve and demand effects do not apply.

The second stage is concerned with participants' compliance and reactance motivations. Compliance is observed when participants want to produce an experience or a behavior consistent with their understanding of the experimental effect (which is not necessarily the one that the researcher has in mind). In contrast, reactance is characterized by a desire to affirm one's sense of independence (Rosenberg and Siegel 2018) and it may contribute to effects opposite to the experimental hypothesis held by experimenters and participants (e.g., experiencing or reporting more negative CS feelings after their pairing with positive than negative USs). Reactance may also contribute to usual effects if participants are hypothesis-mistaken (i.e., a reactant participant may produce the common assimilative EC effect if holding a contrastive hypothesis about the effect of CS-US pairing). Similar to the hypothesis generation stage, it is also possible that participants have no compliance or reactance motivation whatsoever in the testing situation. This may for instance apply to cases where participants are unclear about what social role they should comply with or react to in the experimental setting. In this case, demand effects also do not apply.

Two important points should be stressed here. First, participants' compliance is not necessarily about the experimenter's hypothesis, but about the experimental hypothesis, that is, the one that the participant assumes (e.g., Orne 1973; Sharpe and Whelton 2016). Second, the motivation to comply with the experimental hypothesis is not always driven by the intention to please the experimenter. For instance, in EC research, participants may want to comply because they think that to do so will boost their performance.

The third stage is concerned with compliance (or reactance) strategies that participants may implement. Demand characteristics can (and are commonly thought to) create faked behavior whereby participants apply intentional control over their responses in a way that does not reflect their genuine experience. Research suggests a wealth of faking strategies used when completing both direct and indirect measures (Röhner et al. 2022, 2025; Röhner and Ewers 2016). Two additional strategies, however, may be implemented that will create *genuine experiences*.

The first of these, imagination, is intentional and conscious. It occurs when participants consciously decide to be transported by the procedure (such as when reading a novel or watching a movie) to experience more positive (negative) feelings about CSs paired with positive than negative USs. Because this strategy will create genuine experiences, EC effects will be observed even when the evaluative measure limits participants' control over their response, such as when using implicit measures (see Corneille and Gawronski 2024; Corneille and Lush 2023).

The second of these is phenomenological control (Dienes, Lush, and Palfi 2022; Dienes, Lush, Palfi, et al. 2022; Dienes and Lush 2023; alternatively, “ability to alter experience”, Dell 2021, 2024). It occurs when participants have or had an intention to create a genuine experience, but hold no conscious knowledge of having created it intentionally. This strategy may for example be implemented when participants have an interest in tricking themselves into experiencing as unintentional a phenomenological experience they have intentionally created (for instance, to experience a bodily illusion; Lush 2020; Lush et al. 2022).

4 | Traditional Approaches to the Demand Issue Delivered Inconclusive Outcomes

4.1 | Concern #1: Awareness

The fact that demand characteristics may contribute to EC effects was so obvious to early EC researchers that they immediately sought to rule it out. This was attempted with a powerful test: showing EC effects in the absence of CS-US awareness. Indeed, empirical studies quickly emerged that sought to reject (e.g., Staats 1969; Staats and Staats 1958) versus support (e.g., Page 1969, 1974) a demand account of EC by showing its insensitivity versus sensitivity to contingency awareness. The rationale here being that a lack of CS-US pairing awareness implies a lack of capacity to apply the experimental hypothesis to the individual stimuli. Whether EC effects are observed without awareness of the CS-US pairings has been empirically addressed in dozens of studies, and discussed in several review articles (Corneille and Stahl 2019; Sweldens et al. 2014). The most recent review on this question has concluded that there is a lack of evidence for it. In particular, no EC effect is obtained when CS-US pairs are presented very fast (Stahl et al. 2016) or under conditions of perceptual suppression (e.g., Högden et al. 2018), when a concurrent task compromises the successful encoding of the CS-US pairs in memory (Mierop et al. 2017), or even when participants cannot remember the CS-US at the time they are requested to provide an evaluation of the CSs (e.g. Stahl et al. 2023; for a recent discussion, see Gawronski and Corneille 2025).

The lack of evidence for unaware EC is not positive evidence that demand characteristics play a role in these effects. Several accounts propose genuine EC effects that are based on or are made more likely by explicit knowledge of the stimulus pairings (De Houwer 2018; Gast 2018; Stahl and Aust 2018). However, the finding that EC is strongly related to contingency awareness and manipulations that increase conscious processing does establish demand effects as a potential contributor to EC effects.

4.2 | Concern #2: Goal-Sensitivity

Another test for rejecting a demand account of EC has consisted of showing that the effect is found even when participants are distracted from the real purpose of the study. A strong and influential test was conducted by Olson and Fazio (2001) in a procedure relying on an incidental learning paradigm where the CS-US pairings were not the focus of participants' attention. Incidental procedures are relevant to demand accounts because

they reduce participants' capacity to identify both the CS-US contingencies and the experimental hypothesis. Recent replications, however, have failed to find evidence for EC effects in that procedure in the absence of memory of the CS-US pairings; more generally, EC effects are largely weakened in that procedure (Kurdi et al. 2022; Moran, Hughes, et al., 2021).

A contrario, studies have found a large sensitivity of EC effects to both direct and more indirect processing instructions. For instance, participants asked to identify commonalities between two drawings prior to entering an evaluative conditioning procedure later show a larger EC effect than participants asked to identify differences between these drawings (Corneille et al. 2009). Moreover, the EC effect is eliminated when instructions render the evaluative nature of the USs irrelevant (Gast and Rothermund 2011). In the same vein, presenting the CS-US pairings as relevant to each other (Moran 2024), as diagnostic or nondiagnostic (Kurdi and Banaji 2019), predictive or non-predictive for a valent outcome (Zanon et al. 2012), as friends or enemy (Fiedler and Unkelbach 2011), or orienting US processing toward brightness rather than valence (Stahl et al. 2016) markedly moderates the effect (and can even reverse it).

Manipulations of these sorts are likely to influence participants' understanding of the experimental effect put under test, and EC effects may vary as a result of this understanding. Again, this is not proof that demand characteristics play a significant part in these effects. For example, such manipulations may influence the depth of encoding or distract from US valence as a relevant feature (Gast and Rothermund 2011). However, these findings do support the view that EC effects can be modulated by participants' understanding of the task's objectives, which can easily be accounted for by a demand account.

4.3 | Concern #3: Replication in Instruction-Based Procedures

Orne (1962, 2009) acknowledged the difficulty of establishing a demand account, but thought that a relevant way to address this question was to examine whether participants could predict or simulate the effect when merely instructed about the procedure. As recently reviewed by Corneille and Béna (2023), these *instruction-based replication procedures* can take on three forms: participants may be asked to complete the measures directly after receiving the procedural information, or they may be asked to predict the effect for themselves or for other participants based on that procedural information, or they may be asked to simulate the effect after receiving that information. These experiments have robustly replicated EC effects (e.g., Corneille et al. 2019; De Houwer 2006; Gast and De Houwer 2012, 2013; Hütter and De Houwer 2017; Ingendahl et al. 2024; Kurdi and Banaji 2019; Moran, Van Dessel, et al., 2021).

A successful replication of EC effects in experiments where participants are merely instructed about procedures does not imply that these effects are mere demand artifacts. Orne (2009) himself noted that no definite conclusion can be drawn from processes at play in regular procedures by examining processes

applying to instructional ones. Yet, it is striking that recent work on instruction-based EC procedures are so closely related to what Orne (2009) considered the best support for a demand account (see Corneille and Béné 2023).

5 | Discussion of Three Recent Studies Addressing a Demand Account

There has been a recent surge of interest in the issue of demand effects in EC, which is perhaps sparked by the conclusion that this effect is based on conscious and goal-dependent processes. We consider this a promising development. Irrespective of its results, it will increase our understanding of both the processes underlying EC and of the subtle mechanisms that cause and are caused by participants' expectations in psychological experiments.

We will focus our discussion on three recently published studies, all of which were mainly interested in testing the contribution of demand characteristics to EC effects. Our intention here is not to criticize these particular studies. In many regards, they go beyond previous empirical efforts. Rather, we discuss them because they offer good illustrations of continued methodological challenges associated with research on demand characteristics.

In particular, these studies highlight two broad challenges and a common limitation. Both challenges relate to the central aspect of demand that participants do not stop being thinking subjects by entering the experimental setting. The first challenge relates to the manipulation of the experimental hypothesis. It might seem straightforward to test the role of demands by directly communicating experimental hypotheses to the participants and see whether participants are sensitive to this communication. This approach, however, may alter expectations and motivations arising in regular procedures.

The second challenge relates to measuring demands. Once we assume that participants are capable of giving both genuine and not genuine responses, we also have to accept that this capacity does not stop when we ask them what they think the experiment is about. Hence, we can never be entirely certain that participants provide reliable responses. In our view, limitations of this sort call for much caution when drawing conclusions about the role that demand characteristics may (not) play in psychological research.

The common limitation is that the focus is often restricted to generation of non-genuine responses. As detailed above, however, demand accounts encompass other processes, that is, imagination and phenomenological control, which can produce genuine evaluative responses.

5.1 | Study #1 (Nudler et al. 2024)

Nudler et al. (2024) addressed the role of demand characteristics in EC by communicating directly to the participants different

experimental hypotheses across different experimental conditions (i.e., assimilative, contrastive, both, or none). They found a statistically significant moderation of the EC effect by this manipulation in only one of the three studies reported in the article. They concluded that they had obtained *experimental* evidence that demand characteristics do not play a dominant role in EC effects. There are two important limitations coming with this approach.

A first limitation relates to the lack of compelling evidence for the effectiveness of the experimental manipulation aimed at flipping participants' beliefs about the experimental hypothesis. In Experiment 1 and 2, participants reported endorsing to a greater extent an assimilative than a contrastive hypothesis in the contrastive condition. The third experiment observed a very slight reversal of belief, but still found that a majority of participants reported that other individuals would generally show an assimilative effect in the contrastive hypothesis condition. In fact, across the three experiments, even in the contrastive condition, participants were much more likely to report that participants would generally show an assimilative than a contrastive effect (Experiment 1, 58% vs. 20%; Experiment 2, 63% vs. 21%; Experiment 3, 51% vs. 30%). The difficulty of reversing people's experimental beliefs has been observed in other recent studies relying on a "hypothesis-reversal" approach (e.g., Lush 2020; Mertens et al. 2021).

Nudler et al. (2024) report that, across experimental conditions, the minority of participants who reported endorsing a contrastive hypothesis still showed an assimilative effect. This seems to reject a demand account. Three comments are in order. First, again, the nature of this evidence is not—contrary to what the title claims—experimental. Second, even assuming that demand characteristics played no role in effects found in that particular subset of participants, this would not reject the possibility that they played a role in the large majority of participants who did endorse an assimilative hypothesis. Third, it is possible that this subset of participants showed reactance effects. This leads to the second limitation.

A second limitation relates to the fact that directly communicating the experimental hypothesis to the participants may induce or prevent considerations about the experimental situation that would take place otherwise. For example, stating the hypothesis may be considered a violation of an experimental norm, which might cause the participant to wonder whether the experimenter is testing their conformism or integrity. In any case, the active sense-making processes through which participants form beliefs about the experimental situation, as well as motivations associated with it, may operate differently when the hypothesis is blatantly given. Importantly, this might be particularly the case when the stated hypothesis seems implausible (as might be the case in the contrastive condition). Supporters of demand accounts have emphasized that the effects of blatant cues are not straightforward. For instance, Orne (1962) noted that "In fact, demand characteristics may be less effective or even have a paradoxical action if they are too obvious. With the constellation of motives that the usual subject brings to a psychological experiment, the 'soft sell' works better than the 'hard sell.'" (116).

5.2 | Study #2 (Ingendahl et al. 2024)

This article focuses on demand compliance in EC and the role that agreeableness as a personality characteristic might play in this link. Here, the authors first administered the agreeableness items from a Big-Five questionnaire, then examined how much compliance participants showed in a first procedure where the experimenter directly disclosed the experimental hypothesis to them (e.g., stimuli appearing on the left should be preferred to stimuli presented on the right). Then, participants took part in a second, EC, procedure and the magnitude of their EC effect was correlated with the level of compliance they had displayed in the first procedure. The authors found a correlation of $r = 0.13$, which they interpreted as modest support for a demand account of EC effects.

First of all, it is important to note that this value might underestimate the relationship if one or both measures lack reliability or validity for assessing demand compliance, or if demand compliance is not stable across these situations. In fact, a *negative* correlation was observed in Nichols and Maner's 2008 study between participants' responses to a social desirability questionnaire (collected at the end of the study) and their behavioral compliance with the experimental hypothesis communicated (in their case, more subtly) in the first procedure (i.e., the one aimed at measuring their level of compliance). Furthermore, and as acknowledged by Ingendahl et al. (2024), the approach to correlate compliance in one procedure with the effect in another is perhaps most relevant for estimating faking, but less so for imagination.

As a second concern, the procedure is described as based on a study by Nichols and Maner (2008) but it actually deviates from it significantly. Consistent with our above discussion regarding the risk of blatant disclosures of experimental hypotheses, Nichols and Maner (2008) avoided a direct verbal information from the experimenter. Instead, the information was relayed by a confederate in the guise of previous participants leaving the experiment. In contrast, in the study by Ingendahl et al. (2024)'s the hypothesis (left-side bias) was presented as part of the experimental procedure. Considering the sense-making assumption of demand characteristics research, this might be a crucial deviation that alters the social contract between participants and experimenters. An indication of this is that no participant acknowledged being aware of the experimental hypothesis in Nichols and Maner (2008) whilst all participants included in Ingendahl et al. (2024)'s study reported being aware of it. More generally, as explained above, it is unclear whether blatantly communicating a hypothesis leads to the same effect as more subtle cues.

The mentioned agreeableness questionnaire at the beginning of the study is another departure from Nichols and Maner (2008). Consider the beliefs about the experimental hypothesis that may arise in participants who are first asked to complete an agreeableness questionnaire, next explicitly informed of the experimental hypothesis (which may or may not be considered plausible by the participants) and only then given the experimental task. The demand characteristics of this situation are highly dissimilar to those of a procedure in which the task is performed in isolation.

5.3 | Study #3 (Van Dessel et al. 2025)

Study 3 was concerned with participants' beliefs about (1) the nature of the CS-US pairings (i.e., procedure-related beliefs), (2) how the pairings may influence their responses (i.e., effect-related beliefs), and (3) what the experimenter believes is the effect of the CS-US pairings on participants' responses (i.e., researcher-related beliefs). It suggested generally high levels of hypothesis awareness in the participants. However, a demand compliance measure indicated relatively lower levels of demand compliance. In addition, the demand compliance measure was not consistently found to mediate the evaluative effects of the (verbal or regular) pairing procedure.

As the two previous articles, this research reports an interesting set of findings. It is not clear, however, how diagnostic the test was of demand artifacts. Unfortunately, no information was provided on the validity of the awareness and demand compliance measures. This validity issue has been regularly raised by demand theorists (Nichols and Maner 2008; Orne 2009; Rubin 2016; Staats 1969). Van Dessel et al. (2025) acknowledge this common validity issue.

An additional concern applies to the demand compliance measure. The participants were asked to report "whether they had altered their self-reported ratings and IAT performance in order to concord with the presumed experimental agenda" (Van Dessel et al. 2025, 8). This measure thus addresses faking as a behavior-based demand strategy and leaves out experience-based ones. The same concern applies to the hypothesis awareness question, which - by asking about the performance in the IAT, was also concerned with the response production level. Participants were asked whether "(...) they had ever considered that, during the experiment, the experimenter was attempting to influence their performance on the IAT." (Van Dessel et al. 2025, 8). In contrast, an experience-level question would have been concerned with generating impressions. That this question was a response-level question is supported by the hypothesis awareness responses on the evaluative self-reports versus IAT (79% vs. 36% in Study 1; 60% vs. 22% in Study 2; if an experience-level question had been used, the reports would probably have been much more similar).

We note that, even within the limited, response-level, understanding of "hypothesis awareness" and "demand compliance" endorsed by Van Dessel et al. (2025), and despite reasonable doubts that fakers may not be willing to report that they fake, the findings show that a very large number of participants did report being hypothesis aware and to fake their response in the EC procedure. Hence, if one assumes that these measures were valid, this should add to our concerns regarding the role of demand artifacts in EC research.

6 | General Discussion

EC research has a vexing demand characteristics problem. EC has not been reliably obtained without CS-US pairing awareness; it is largely weakened in incidental learning conditions, and it is only observed among participants who are aware of the

CS-US contingencies in these conditions; it can be weakened, suppressed or even reversed as a function of processing instructions directly or indirectly activated in the situation; the EC effect is also obtained based on mere knowledge of procedural information, which is a classic test for the potential of demand effects; finally, recent research suggests that many participants may be pretty much aware of what hypothesis is tested in the procedure, and even report providing fake responses to comply with it. As we pointed out above, this does not even include what Corneille and Lush (2023) claimed to be perhaps the main compliance strategy used in EC studies: imagination. This problem is vexing because it threatens the internal and external validity of EC research.

6.1 | Is the Demand Account Refutable?

In demand accounts, participants are considered active sense-makers integrating multiple cues and going beyond the information given. They are also seen as motivated agents who can hold contradictory motivations and can rely on a diversity of strategies to comply with (and sometimes, react to) the experimental hypothesis. This complexity allows for much flexibility in the interpretation of study findings, and therefore one may object that demand accounts are virtually non-refutable. We disagree with this conclusion.

At the heart of demand artifacts is the existence of a confound between treatment and expectations about treatment effects. The confounding effects of participant beliefs can in principle be addressed by experimental blinding, a methodological development that was first formally applied in the late 18th and early 19th century to test claims about the mechanisms underlying the reported effects of mesmerism and homeopathy and is common today in the form of “placebo control” in clinical research (Kaptchuk 1998). Hence, a sound test would consist of comparing the EC effect across conditions where the treatment (i.e., the CS-US pairing) is applied or is not applied while holding effectively constant participants' expectations about a treatment effect across conditions. Such design would allow isolating effects of treatment versus treatment expectations. Any incremental contribution of a treatment effect would be difficult to explain based on a demand account. Furthermore, finding no effect of mere expectations would minimize concerns about the role of demands. Admittedly, this approach may not be easily implemented in EC research. However, this has nothing to do with the non-refutability of a demand account.

A second approach is the one that has consisted in testing unaware EC effects. If participants do not know they are treated, they should not be able to raise and comply with treatment expectations. In the case of EC, there has been a decade-long consensus (both a priori and a posteriori) that unaware EC represented a highly diagnostic case for rejecting the role of demands. EC researchers have capitalized for decades on (what later appeared to be weak) evidence for unaware EC for claiming that demands play little to no role in EC. Again, that no such evidence could reliably be found speaks to the lack of refutation of the demand account, not to its non-refutability.

Finally, finding EC effects outside the lab would also support the view that the EC effect cannot be merely interpreted as an artifact arising because of experimental demands (see Turner et al. 1975, for an application of this rationale in research on the weapons effect). Unfortunately, to our knowledge, EC research reliably implementing CS-US pairings and collecting attitudinal measures in naturalistic settings is very scarce and has delivered mixed outcomes (for a similar conclusion, see Moran et al. 2023). Relatedly, Moran et al. (2025) recently examined the meta-analytic effect of EC interventions aimed at changing real life attitudes.¹ Only a fraction of the reviewed studies, however, implemented the intervention outside the lab and most suffer from methodological limitations. A recent set of unpublished studies from one of our labs aimed to combine a naturalistic setting while avoiding confounding factors. In these studies, participants experienced both a positive-neutral and a negative-neutral stimulus pairing during a university lecture. The results suggest that it is at best difficult to find EC effects in this setting (Gast et al. 2025). More research is needed on these questions where participants are much less likely to be hypothesis aware, ideally achieved in the context of adversarial research collaborations.

Confounds between treatment and expectations about treatment effects are not specific to EC research (for a discussion, see Boot et al. 2013). What is particularly concerning with EC research, however, is the accumulation of results that can be explained with a demand account combined with failures at rejecting it. In comparison, one can think of psychological treatments that are not confounded with expectations (to put it simply: treatment effects that naïve respondents cannot easily predict), procedures that are largely effective out of the lab (e.g., ratio-variable reinforcement schedules), and/or that may be observed under conditions of reduced treatment awareness (artificial grammar learning). The reason why the demand problem is particularly vexing in EC research has to do with two points. First, pairings procedures in EC research are straightforward, which makes it easy to correctly guess the hypothesis. Second, EC effects are strongly correlated to factors that are also relevant for understanding and conforming to the hypothesis, in particular processing instructions, attention, and memory.

6.2 | Demand Effects in the Broader Context of Attitude Formation Theories

A major theoretical and empirical endeavor for future research is to delineate demand from propositional/declarative accounts of EC (some of which conceptualize evaluative procedures as persuasion attempts; Moran et al. 2023). Both propositional and demand accounts see EC as an inference-driven (as opposed to associative) effect. A demand account, however, encompasses the role of social motivations and inferences in the production of the effect. From a social psychological perspective, it is important to consider that participants may be interested in drawing inferences not only about the target stimuli within the experiment (e.g., what does it tell me about Niffians that they are repeatedly presented along with images of polluted environments), but also about their social role and image in the testing situation (e.g., What am I supposed to do with these

pairings? What is expected from me here? What's a decent response to this?)

For an effect to be due to demand, it is crucial that it would not occur without the participant's assumptions about the experimental hypothesis. It is thus not solely based on inferences about the world within the experiment (such as the conclusion that Laapians are nasty if they co-occur with nasty things), but it necessarily involves considerations about the social context of the experiment (such as the consideration that someone might be interested in showing that Laapians feel nasty if they co-occur with nasty things). Current propositional accounts largely ignore this social dimension of the experiment and limit explanations to epistemic motives and inferences that are assumed to be under experimental control (e.g., what kind of information can I gain about Laapians and Niffians?) Propositional models propose processes that could apply in the real world and test them in the lab. A demand account reminds us, however, that EC effects found in the lab might be due to social expectations and motivations elicited by cues that are specific to the testing situation. When these cues and the processes they trigger are ignored in the theorization of the effect, they represent artifacts threatening the internal and external validity of the study.

Another theoretical challenge is to distinguish demand accounts from memory accounts of EC. Similar to propositional models, current memory models of EC do not specifically deal with the experimental setting as a social situation and the motivational effect it might have on encoding or retrieval processes. At the core, memory processes simply provide the information for the later judgment process. In this sense, memory models are agnostic. At the same time, memory models do assume that all factors that affect memory also affect EC and it is highly plausible that social or motivational factors do this, for example via attention or sense-making processes during the encoding stage. Similar to propositional models, it is helpful to think about which effects would not have been found if the situation was the same but without the additional social layer we just discussed. It is possible that (at least under some conditions) both demand and memory are necessary conditions for an EC effect to occur. It is also possible that (at least under some conditions) only memory is necessary. Practically, it might often be difficult to distinguish whether an effect is due to demand because factors that produce a demand effect may also influence memory, attention, and processing goals.

7 | Conclusion

We welcome the recent revival of interest in the role of demand characteristics in EC research and hope that the present contribution highlights methodological and theoretical challenges that future research around these questions should overcome. Demand artifacts need not be seen only as a vexing problem. Precisely because they are so conceptually and methodologically challenging, they represent an opportunity for methodological and theoretical development (Corneille and Lush 2023). Achieving this, however, requires that the role of demand characteristics in EC (and related procedures) is not too

readily dismissed. EC research is plagued with the very same issues we discussed in our opening paragraph. We believe that these issues are concerning and should be acknowledged.

Author Contributions

O. Corneille: conceptualization, writing – original draft, writing – review and editing, project administration. **A. Gast:** conceptualization, writing – review and editing. **P. Lush:** conceptualization, writing – review and editing. **C. Stahl:** conceptualization, writing – review and editing.

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Ethics Statement

This theoretical contribution complies with ethical standards and guidelines in psychological research. Because this project involved no data collection or analysis, no ethical clearance was requested.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

This is a theoretical contribution. No data collection or analysis was involved.

Endnotes

¹ Moran et al. (2025) found a small but statistically significant (Hedges' $g = 0.21$) meta-analytic effect that was not moderated by the intervention setting (i.e., lab, online studies, or field experiment). Different results emerged after correcting for publication bias, with one correction suggesting a very small ($g = 0.12$) but statistically significant corrected estimation, while the other suggested a statistically non-significant effect ($g = 0.07$). These corrections, however, may have been biased in case of heterogeneity.

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