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Is There a Hierarchy of Effects in Advertising?
Empirical Generalizations for Consumer Packaged Goods

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Abstract

Advertising influences purchase behavior when it changes how consumers think and feel about brands. While the hierarchy-of-effects (HoE) framework has guided advertising decisions for decades, some authors question its validity. Indeed, to date, HoE lacks comprehensive empirical validation and generalization. This article analyzes how cognition, affect, and experience mediate advertising effects on sales, using data from 178 fast-moving consumer goods brands in 18 categories over seven years. It compares the models proposed in the literature and concludes that the concept of integrated HoE, which signifies sequentiality, holds up well. Importantly, the operating sequence varies across brands, with the predominant one being affect → cognition → experience (ACE). Furthermore, category and brand characteristics such as the hedonic versus utilitarian nature of the category, brand differentiation, and brand market share moderate which HoE sequence is more likely to hold for a brand. The incidence of ACE is stronger for utilitarian products and less differentiated brands. For managers, the results show that the last factor in the HoE sequence is most important in driving sales while affect is the intermediate factor most responsive to advertising.

Keywords: hierarchy of effects, advertising, sales response, intermediate factors, time-series econometrics, mindset metrics

The hierarchy-of-effects (HoE) framework has been enthusiastically embraced in the community of marketing practioners (Talbot 2020; Weilbacher 2002) and has found its place in important marketing textbooks (e.g., Belch and Belch 2018; Kotler and Armstrong 2018; Kotler and Keller 2012) and core marketing courses. This framework describes how advertising influences consumers' purchase decisions. The central idea is that advertising moves consumers through a sequence of mental phases, from being unaware of a brand to being aware, opening hearts and minds to the brand, and eventually purchasing it. Postpurchase experience is often part of the reinforcement loop in this process. The HoE is a process model of buying behavior (Lemon and Verhoef 2016) and can be considered a special version of the purchase funnel models in use to map the customer journey in an online context (Batra and Keller 2016; Hoban and Bucklin 2015; Kim, Jiang, and Bruce 2019; Wiesel, Pauwels, and Arts 2011). The specificity of the HoE framework is its focus on directly measuring the attitudes and mindset of prospects and customers and the sales response initiated by advertising.

Palda (1966) was the first to use the term "hierarchy of effects" in reference to the work of Lavidge and Steiner (1961) on advertising effectiveness, but Barry's (1987) history of the framework begins in 1898. Research has since proposed a large number of variations. The HoE framework is intuitive, but it remains unclear whether managers can really rely on it to track how advertising affects the customer mindset and to make better advertising decisions. Two complications arise. First, Vakratsas and Ambler (1999) (V&A hereafter) put the very notion of hierarchy into question and, in a vast literature review, find little support for any temporal hierarchy. Instead, they propose that the three intermediate factors— consumers' cognition (C), to describe the "thinking" dimension; affect (A), for the "feeling" dimension; and experience (E), for the memories of prior interactions—simultaneously drive sales, in turn reinforcing experience. In a more direct critique of HoE, Weilbacher (2002, p.

49) asks, in a reply to Barry (2002), "If a widely accepted theory has not been proven over the course of 100 years, isn't it time to say so?"

A second complication is that no single sequence applies to all brands and products (Assael 1987). For example, Ray et al. (1973) propose three different sequences: the learning hierarchy (cognition → affect → experience, or CAE sequence), the dissonance attribution hierarchy (experience → affect → cognition, or EAC sequence), and the low-involvement hierarchy (experience → cognition→ affect, or ECA sequence). This proposal of sequences is still disseminated in contemporary marketing textbooks (e.g., Kotler and Armstrong 2018). By contrast, Vaugh (1980) presents four possible sequences based on a classification of types of consumer decisions for different product types: rational (CAE sequence), habitual (ECA sequence), feeling-driven (affect → cognition → experience, or ACE sequence), and imitative (EAC sequence). In summary, little agreement exists on the incidence of the HoE sequences and how they might vary across brands and product categories.

For all the attention that HoE has received in the marketing discipline in the past decades by both academics and practitioners, the lack of empirical evidence for it or for alternative hierarchies is surprising. V&A reviewed more than 250 articles, but none empirically examine the complete sequence from advertising through intermediate factors to sales to determine which hierarchy applies. Srinivasan, Vanhuele, and Pauwels (2010) are probably the first to effectively include these intermediate factors (which they refer to as mindset metrics) in a sales response model with advertising, among the different marketing instruments, but they do not examine the possibly sequential nature of these metrics. By contrast, Bruce, Peters, and Naik (2012) (BPN hereafter) develop a dynamic sales response model of advertising that does allow inferring the sequence of mindset metrics that best explains sales. Unfortunately, they had data only for one brand at their disposal. As such,

general substantive conclusions on the usefulness of the HoE cannot be drawn from their work.

Given the lack of empirical evidence on the HoE, our objective is to generate empirical generalizations that are useful for marketing managers. Does the HoE exist or not? If it exists, what are the most likely sequences? Which intermediate factor is most important in driving sales? Which brand and product category characteristics influence the results?

To answer these questions, we undertake a large-scale econometric analysis in which we compare the 13 alternative hierarchies proposed in the literature. These hierarchies come in three types: the classical HoE, the simultaneous HoE (based on V&A), and the integrated HoE (based on BPN). We estimate the corresponding models for 178 brands in 18 different fast-moving consumer goods (FMCGs) categories, on brand-level tracking data collected for usage by brand and product managers. The product categories differ in the extent to which they are utilitarian or hedonic, and brands differ in differentiation and market share. This variation allows us to test the idea that the nature of a product and brand determines which hierarchy applies.

Our study contributes to the empirical marketing literature on advertising effects on sales in four ways. First, to our knowledge, our research is the first to systematically investigate whether advertising's HoE model is empirically valid, using comprehensive data. We show that the integrated HoE fits better than any alternative. Previous studies on HoE apply only to a single product (e.g., BPN) or apply to multiple products but only attempt to uncover whether mindset metrics matter in explaining sales (e.g., Srinivasan, Vanhuele, and Pauwels 2010), thus ignoring the question of sequentiality. The topic of the HoE model is fundamental not only to brand managers and advertisers but also to marketing academics, given that they conduct research on advertising response and teach the concept of HoE initiated by advertising in their marketing curricula.

Second, drawing on cognitive-experiential self-theory (CEST) (e.g., Epstein 1993), we reconcile prior mixed findings on the presence and sequential patterns of the HoE. We show that the sequence of the hierarchy differs by brand, with the ACE sequence being the most common in our sample.

Third, building on a conceptual framework on consumers' needs, motivations, opportunity, and ability to process brand-related information (MacInnis and Jaworski 1989), we propose moderators of the HoE sequence and find that the hedonic nature of the category (representing needs and motivations) and brand differentiation and market share (representing the opportunity and ability to process brand-related information) moderate the ordering of the intermediate factors (cognition, affect, and experience) in the HoE sequence. In this way, we contribute empirical generalizations to the moderating role of category and brand characteristics in the HoE sequence.

Fourth, we show how advertisers and brand managers can use the HoE to leverage data at their disposal: advertising (input), mindset metrics (throughput), and sales (output). We show that using the right HoE framework and sequence helps determine which intermediate factor is most important in driving sales and how responsive the intermediate factors are to advertising for the type of brand and product the firm sells (Moorman and Day 2016). Our findings also help inform the design of advertising campaigns and allocation of budgets to differentially influence the hierarchical sequence for the brand.

Relevant Background Literature

Classical HoE Model

The AIDA (attention, interest, desire, and action) framework has influenced advertising theory and practice for decades (Colley 1961; Talbot 2020). Its central idea is that

consumers' awareness of (or attention to) a need, often by way of exposure to advertising, is the first step in the purchase process. The awareness stage precedes the construction of a consideration set of plausible solutions (brands, products, or services) that fulfill the need (the interest stage). Next follows the formation (or uncovering) of preferences over these products (the desire stage), and, finally, the purchase itself (the action stage). Traditionally, research has envisioned the AIDA as a linear process (Colley 1961), progressing from one stage to the next, with marketing interventions exerting influence at each stage. The exact sequence of the effects has been a matter of debate, however, and a rich body of research has proposed that different hierarchies may operate in different situations (Ratchford 1987).

Building on the AIDA model, intermediate factors are also the foundations of the HoE model (e.g., Barry and Howard 1990; Lavidge and Steiner 1961; Palda 1966; Vaughn 1980, 1986). Lavidge and Steiner (1961) propose a path that starts at a cognitive stage (awareness, knowledge), enters an affective stage (liking, preference), and ends at a conative or behavioral stage (trial, purchase). Colley (1961) developed the awareness, comprehension, conviction, and action hierarchy around the same time. The notion of a hierarchy of effects was then incorporated into consumer behavior models (e.g., Howard and Sheth 1969; Wolfe, Brown, and Thompson 1962), outlining attention, comprehension, attitude, intention, and purchase as the response sequence of buying behavior. The specific influence of advertising at each of these stages was argued to be dependent on the industry, the product, and the brand's prevailing market position.

Subsequently, different hierarchies were proposed depending on the context in which advertising operates. The Foote, Cone & Belding ad agency (now FCB Global)[1] provided the conceptual foundation for the various permutations of the three intermediate factors (cognition, affect, and experience). Vaughn (1980, 1986) supported the notion that there are actually four possible hierarchy models depending on whether the focal product is a high- or

low-involvement product and whether thinking or feeling is predominant in the purchase process. Preston and Thorson (1984) reviewed the HoE models and concluded that, with expanded steps of the original model, the notion of a sequential hierarchy could be kept intact, specifically if that hierarchy related to advertising objectives and effectiveness. Barry (2002) suggested that HoE models are important to practitioners and academics, proposing that the models continue to be valid in the marketplace because of their intuitive and logical framework. Overall, the HoE model has been an influential framework to analyze intermediate effects of advertising and has been widely used to intuitively optimize advertising decisions on copy content, media plans, and budgeting.

In summary, the classical HoE view holds that advertising triggers one of the three intermediate factors—cognition, affect, or experience—to then move consumers sequentially through the remaining two stages. In this view, a hierarchical sequence (i.e., any one of the six permutations of cognition, affect, and experience) follows advertising and precedes sales.

Simultaneous Effects on Sales

At the same time, some scholars have put the notion of hierarchy in advertising effects into serious doubt (e.g., Ambler 1998). Palda (1966) has argued that not all consumers could be expected to go through these hierarchy stages; for example, some consumers may purchase with the mere awareness of a brand's existence. His criticism of the hierarchy was directed at each step of the process rather than at the hierarchy concept as a whole. By contrast, in a review Moriarty (1983) rejected the HoE, suggesting that its linear processes do not illustrate how the sequences are connected, what they have in common, or their patterns of advertising effects. Similarly, Henderson and Rust (1987) contended that the major flaw of the hierarchy models is that they disregard the possible interaction between the steps (e.g., cognition and affect). Ehrenberg's (1974) critique of the HoE stemmed from his view that advertising was not as powerful as its proponents believed and that repeat buying (i.e., past experience) is the

main determinant of sales. Likewise Weilbacher (2002) questioned the notion of a linear step-by-step progression in the hierarchical sequence and deplored the lack of systematic empirical evidence that the HoE model is a valid description of how advertising works.

Reviewing more than 250 studies, V&A argued that advertisements may contain informational content that appeals to cognition, emotional stories that generate affect, and product attributes that experientially connect with experience. When consumers view advertisements, these aspects trigger all intermediate effects simultaneously. V&A's conclusion in favor of a sequence-free model in which all three stages occur simultaneously in response to advertising exposure implies that the HoE model is dead, because there is no (observable) hierarchy; however, they do not empirically test their proposed model.

Integrated HoE Model

Given V&A's conclusion, subsequent empirical models of marketing with intermediate factors, that are referred to as mindset metrics, do not impose or explicitly investigate a hierarchy but instead choose a flexible method that accounts for any or no hierarchy and for dual causality of any mindset metric with sales (Hanssens et al. 2014; Pauwels, Erguncu, and Yildirim 2013; Srinivasan, Vanhuele, and Pauwels 2010). These articles find that the addition of mindset metrics to a sales model that already includes the marketing mix significantly enhances explanatory power in predicting brand sales.

BPN propose an integrated framework that augments the dynamic advertising–sales response model by integrating the hierarchy, dynamic evolution, and purchase reinforcement of intermediate factors. For their studied brand, they find the best fit not for the V&A model with simultaneous effects but for an integrated HoE of advertising with an ECA sequence and dual causality with sales. Indeed, they show that advertising ignites both the intermediate factors and sales simultaneously, which is contrary to the long-standing belief that advertising

solely triggers the initial intermediate factor in the sequence (Colley 1961). However, their empirical results are based on a single soft drink brand.

In summary, given the conflicting and inconclusive views on the HoE model, we address and reconcile these gaps in this study. Table 1 provides a comparative assessment of extant HoE literature and our work.

--- Insert Table 1 around here ----

Conceptual Framework

We identified and combined two relevant frameworks of how the HoE may operate in FMCGs: (1) Cognitive-experiential self-theory (CEST; e.g., Epstein 1993) for the presence and sequential patterns of the HoE and (2) the integrative framework of information processing from advertisements (MacInnis and Jaworski 1989) for its moderators. A first question is how the hierarchy stages of the HoE relate to both one another and FMCG sales. The CEST proposes that two conceptual systems operate in parallel and dynamically reinforce each other in any given task: an experiential system, which is affective in nature and associated with crude and rapid processing, and a rational system, which is cognitive in nature and associated with more refined and deliberative processing. For instance, Shiv and Fedorikhin (1999) find that the experiential system dominates when a consumer does not allocate processing resources to a decision-making task, which in their experiments is a choice of snacks (an FMCG).

Is There a HoE in Advertising?

We examine the three distinct HoE models that have been proposed in the literature. In the classical HoE, advertising triggers one of the intermediate factors to initiate the sequence, and the last factor in the sequence drives sales. In the simultaneous HoE (V&A), advertising

influences all intermediate factors simultaneously, and then all of them drive sales jointly. In the integrated HoE (BPN), advertising influences sales and all intermediate factors, but a hierarchy exists between the intermediate factors, sales and the intermediate factors are dynamic, and sales reinforces the three intermediate factors. This reinforcement is especially relevant for FMCGs, for which brand consumption happens soon after purchase, and this information may influence subsequent purchase in a short time frame. Furthermore, the integrated HoE framework accounts for previous findings on dual causality among sales and intermediate metrics (BPN; Hanssens et al. 2014; Srinivasan, Vanhuele, and Pauwels 2010) and also on the presence of carryover effects (Leone 1995). Therefore, the integrated HoE is the most compatible with behavioral theories, consumer behavior experiments, and previous empirical FMCG findings (for our conceptual framework, see Figure 1).

--- Insert Figure 1 about here –

Is There a Dominant HoE Sequence in Advertising?

A second question is which intermediate factor should generally come first in the sequence when there is a hierarchy. The classical view is that cognition comes before affect, both in general decision making and in the HoE (Lavidge and Steiner 1961). By contrast, more recent consumer behavior insights signal affect coming first, especially for low-involvement decisions such as those pertaining to FMCGs (Shiv and Fedorikhin 1999). Consistent with CEST, Berkowitz (1993) proposes that "relatively basic and automatic associative processes" (p. 10) precede more deliberate, higher-order cognitive processes, such as "appraisals, interpretations, schemas, attributions, and strategies" (p. 12), that may serve to strengthen or weaken the action tendencies arising from lower-order affective reactions. Likewise, Zajonc (1989) holds that affective reactions can occur relatively automatically without an active role of higher-order cognitive processes, and Hoch and Loewenstein (1991, p. 498) argue that the desire consumers often feel in shopping situations may "occur with the minimum conscious

deliberation characteristic of automatic or mindless behavior" and "with little or no cognition."

Similarly, there is the question of which intermediate factor should generally come last in the HoE. Experience comes last in the classical HoE (Palda 1966) and its variations (Vaughn 1986), as well as in the most recent models of the online consumer decision journey (Pauwels and Van Ewijk 2020), in which it feeds back into the next purchase and/or word-of-mouth occasion. Experience should be especially powerful in directly driving brand sales for FMCGs, as (1) experience comes fast after purchase, as the short purchase cycle enables this information to be used quickly, and (2) consumers are unlikely to be *motivated* to attend to, let alone change, their minds as a result of advertising. Indeed, when frequently purchasing a product with little risk and the need for little information, consumers are unlikely to be sufficiently motivated to process information from advertising or other sources (MacInnis and Jaworski 1989). More uninvolved consumers are less willing to spend time processing information and evaluating brands (Zaichkowsky 1986). Experience is thus likely to positively influence consumers' responses to advertising in low-involvement conditions by increasing the credibility of the advertising and decreasing purchase risk. Sharp (2016) also suggests that experience is the factor with a direct effect on sales.

In sum, the literature suggests that experience would go last in the HoE sequence, while there are contradictory findings on the ordering of cognition and affect. Therefore, these are empirical questions that we address in this paper.

Are There Moderators of the HoE Sequence?

Next, we focus on the moderators of the hierarchical sequence, based on MacInnis and Jaworski's (1989) framework on how consumer motivation/need, ability, and opportunity to process advertising determine the direction of that processing and the resulting purchase outcomes (Batra and Ray 1986; MacInnis, Moorman, and Jaworski 1991; Petty, Cacioppo,

and Schumann 1983). If motivation, ability, or opportunity are lacking for any reason, consumers' processing of advertising will be affected. The ability to process information could depend, for example, on the amount of differentiation and knowledge of or familiarity with the brand (Zaichkowsky 1986).

Intrinsic *needs* (motivation) of consumers are typically distinguished as utilitarian (e.g., detergent, feminine hygiene, shaving products) or hedonic (e.g., beer, candy, snacks) (Li et al. 2020; MacInnis and Jaworski 1989). Vaughn (1986) was one of the first scholars to use think/feel (utilitarian/hedonic) as one of the two dimensions to classify product categories for advertising effects. He proposed that for utilitarian products, consumers need to first learn about a product and process information (cognition) before evaluating it and developing affect, leading to purchase and experience. In other words, the greater the utilitarian need, the more consumers' attention is focused on how the brand solves their problems.

By contrast, more recent consumer behavior research finds in lab experiments that consumers deliberate more about *hedonic products* because of their higher perceived preference uniqueness (Botti and McGill 2011; Okada 2005). Higher perceived preference uniqueness for hedonic (vs. utilitarian) purchases leads consumers to anticipate having greater difficulty in finding a product to match their unique preferences, resulting in a desire to review a larger assortment of alternatives in the hope of finding a preference-matching product (Whitley, Trudel, and Kurt 2018). For utilitarian products, consumers may deliberate less about the products and choose products from lower-order affective reactions. For hedonic products, Shiv and Fedorikhin (1999, p. 289) note that increasingly "more shopping situations are likely to involve presentation modes that are symbolic, which in turn is likely to result in choices being based less on affect and more on cognitions." This will particularly affect products that are purchased for their hedonic rather than utilitarian value.

Finally, both the *opportunity* and *ability* to process brand information are higher for brands that are more differentiated (so consumers perceive the differences themselves) and for brands that have higher market share (so information can be shared across many customers, such as through word-of-mouth). Consumers do not perceive differentiated brands as substitutes, and thus they will be motivated to compare and evaluate differences (Zaichkowsky 1986). Consistently, Assael (1987) and Ray et al. (1973) argue that cognition comes before affect in the hierarchy when the brand is highly differentiated. By contrast, the lower the opportunity and ability to process information, the less complex are consumers' processing operations (MacInnis and Jaworski 1989).

In sum, we expect that the utilitarian vs. hedonic nature of a category, brand differentiation, and market share moderate the intermediate factor sequence in the HoE.

Methodology

Model Requirements

Our research objectives impose four modeling requirements. First, the model should accommodate multiple equations simultaneously that impose a causal structure to capture the sequence of hierarchy (e.g., advertising →affect→cognition→experience→ sales). Second, the model should treat cognition, affect, experience, and sales as endogenous. Third, we require a model that incorporates intertemporal dynamics of intermediate factors. Consumers' thoughts and feelings are not static but are constantly updated and interact over time. For example, a certain level of experience with a product may increase consumers' cognitive ability and learning in subsequent periods. Therefore, the model should allow for dynamics and dependencies among cognition, affect, and experience. Fourth, the model should be flexible in treating marketing decisions (advertising, price, and promotion) as either

endogenous or exogenous. These requirements led us to consider dynamic factor models (DFMs) as used by BPN. However, DFMs, although very flexible, present model identification and convergence issues that demand intervention at the individual-model level. Therefore, DFMs are not appropriate for our large-scale analysis, whose objective is to establish empirical generalizations across many brands and categories (see the "Robustness Check" section for an estimation with DFMs). Instead, we specify restricted vector autoregressive models, which are formulated by imposing constraints on the model parameters for the 13 HoE configurations (Lutkepohl 2005).

Model Specification

Our model has the following general form for each brand:

$$y_t = \sum_{p=1}^{P} A_p y_{t-p} + B x_t + v_t, \qquad (1)$$

where y_t is a $k \times 1$ vector of endogenous variables, p denotes the number of lags, A_p is a $k \times k$ matrix of parameters for the autoregressive factors at lag p, x_t is an $n \times 1$ vector of exogenous variables (in our application price, advertising, and promotion), B is a $k \times n$ matrix of parameters, and $v_t \sim N(0, \Omega)$ is the error term. In the main empirical application, the endogenous variables are sales and the intermediate factors. Our results are robust to treating the marketing actions (advertising, price, and promotion) as endogenous (see "Robustness Check" section).

We can express the general form of the model using one lag ($p = 1$) in the following matrix-vector form:

$$\begin{bmatrix} C_t \\ A_t \\ E_t \\ S_t \end{bmatrix} = \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} \end{bmatrix} \begin{bmatrix} C_{t-1} \\ A_{t-1} \\ E_{t-1} \\ S_{t-1} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \\ \beta_{41} & \beta_{42} & \beta_{43} \end{bmatrix} \begin{bmatrix} Adv_{t-1} \\ Price_{t-1} \\ Promo_{t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix}, \qquad (2)$$

where C, A, E, and S stand for cognition, affect, experience, and sales, respectively, and *Adv*, *Price*, and *Promo* stand for advertising, price, and promotion, respectively.

To accommodate the different HoE sequences, we impose constraints on the parameters of the model in Equation 2. In addition to allowing for the different HoE sequences, our model formulation can account for the intermediate factors carryover, sales dynamics, purchase reinforcement, and marketing effects. Thus, the three HoE frameworks—classical, simultaneous, and integrated—and six sequences are nested within our specification.

We test the operating hierarchy for each brand on the basis of the three HoE frameworks. In each framework, advertising triggers the intermediate factors differently.

Classical HoE. According to this framework, advertising triggers one of the intermediate factors (C, A, or E) to initiate the sequence, and the last factor in the sequence drives sales. For example, for the hierarchy ECA, our Model 1, the model is

$$
\begin{bmatrix} C_t \\ A_t \\ E_t \\ S_t \end{bmatrix} = \begin{bmatrix} 0 & 0 & \alpha_{13} & 0 \\ \alpha_{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & \alpha_{42} & 0 & 0 \end{bmatrix} \begin{bmatrix} C_{t-1} \\ A_{t-1} \\ E_{t-1} \\ S_{t-1} \end{bmatrix} + \begin{bmatrix} 0 & \beta_{12} & \beta_{13} \\ 0 & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \\ 0 & \beta_{42} & \beta_{43} \end{bmatrix} \begin{bmatrix} Adv_{t-1} \\ Price_{t-1} \\ Promo_{t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix}, \quad (3)
$$

where β_{31} captures advertising affecting experience (E_t); prior experience (E_{t-1}) influences current cognition (C_t), captured by α_{13}; prior cognition (C_{t-1}) influences current affect (A_t), captured by α_{21}; and prior affect (A_{t-1}) drives sales (S_t), captured by α_{42}. The β_{k2} and β_{k3} parameters control for price and promotion effects, respectively. Similarly, we formulate Model 2–Model 6 for the other five possible hierarchies of the classical HoE: Model 2 for the CEA sequence, Model 3 for the EAC sequence, Model 4 for the CAE sequence, Model 5 for the AEC sequence, and Model 6 for the ACE sequence (see Web Appendix W1 for the formulations of these models).

Simultaneous HoE (V&A). This framework states that advertising influences all intermediate factors (C, A, and E) simultaneously and that all of them drive sales jointly. Therefore, we formulate the model for this framework, our Model 7, as

$$
\begin{bmatrix} C_t \\ A_t \\ E_t \\ S_t \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & 0 \end{bmatrix} \begin{bmatrix} C_{t-1} \\ A_{t-1} \\ E_{t-1} \\ S_{t-1} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \\ 0 & \beta_{42} & \beta_{43} \end{bmatrix} \begin{bmatrix} Adv_{t-1} \\ Price_{t-1} \\ Promo_{t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix}, \quad (4)
$$

where β_{11}, β_{21}, and β_{31} capture the simultaneous effect of advertising on the three intermediate factors. Prior cognition (C_{t-1}), prior affect (A_{t-1}), and prior experience (E_{t-1}) drive sales, captured by the parameters α_{41}, α_{42} and α_{43}, respectively. Parameter α_{34} captures purchase reinforcement from prior purchases (S_{t-1}) to current experience (E_t). Finally, the β_{k2} and β_{k3} parameters control for price and promotion effects, respectively.

Integrated HoE (BPN). This framework posits that advertising increases sales and builds brands simultaneously, that all factors exhibit dynamics, and that purchase reinforcement occurs not only for experience but for all three intermediate factors as well. Thus, for hierarchy ECA, we formulate the model, our Model 8, as

$$
\begin{bmatrix} C_t \\ A_t \\ E_t \\ S_t \end{bmatrix} = \begin{bmatrix} \alpha_{11} & 0 & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & 0 & \alpha_{24} \\ 0 & 0 & \alpha_{33} & \alpha_{34} \\ 0 & \alpha_{42} & 0 & \alpha_{44} \end{bmatrix} \begin{bmatrix} C_{t-1} \\ A_{t-1} \\ E_{t-1} \\ S_{t-1} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \\ \beta_{41} & \beta_{42} & \beta_{43} \end{bmatrix} \begin{bmatrix} Adv_{t-1} \\ Price_{t-1} \\ Promo_{t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix}, \quad (5)
$$

where advertising evokes all three intermediate factors and sales jointly, determined by the β_{k1} parameters, and the β_{k2} and β_{k3} parameters control for price and promotion effects, respectively. The parameters α_{11}, α_{22}, α_{33}, and α_{44} capture the intermediate factors carryover and sales dynamics, while α_{14}, α_{24}, and α_{34} measure purchase reinforcement. Finally, similar to Model 1 of the classical HoE, parameters α_{13}, α_{21}, and α_{42} capture the hierarchy ECA. In addition, we formulate Model 9–Model 13 for the other five possible hierarchies: Model 9 for the CEA sequence, Model 10 for the EAC sequence, Model 11 for the CAE sequence, Model 12 for the AEC sequence, and Model 13 for the ACE sequence. Table 2 summarizes the characteristics of the 13 models, and Web Appendix W1 provides model specifications.

--- Insert Table 2 around here ----

Model Identification and Estimation

To ensure the stability of the model, we check whether the roots of the autoregressive polynomial are outside the unit circle. We also allow the intermediate factors to be correlated, which requires that the variance–covariance matrix of the model has nonzero elements in the off-diagonal positions.

Endogeneity. With the exception of the three marketing-mix variables, we treat all variables as endogenous; that is, variables can be influenced by their own past and the past of other variables in a system of equations (see Equations 2–5). All three HoE frameworks (classical, simultaneous, and integrated) assume that advertising initiates the hierarchy (i.e., advertising is an input and therefore serves as an exogenous variable in the model). However, from an empirical standpoint, advertising and other factors may be determined simultaneously. To check this, we estimate the models with endogenous marketing variables (advertising, price, and promotion). We discuss the results in the "Robustness Check" section.

Estimation and model comparison. Because we use constraints in a system of structural equations, we estimate the models by an iterated seemingly unrelated regression algorithm (Zellner and Theil 1962). We use log-likelihood and the Akaike (AIC) and Bayesian (BIC) information criteria to compare the models and determine for each brand (1) which HoE framework operates and (2) which hierarchical sequence of intermediate factors operates. Our main criterion is BIC, given its asymptotic consistency and small sample performance (Lutkepohl 2005). In our empirical application, BIC has 96% and 95% agreement with AIC and log-likelihood, respectively, in identifying the best model fit. We identify a model as statistically superior to another if the improvement in BIC exceeds two units (Burnham and Anderson 2002).

Second-Stage Analysis: Relationship Between HoE Sequence and Category and Brand

Characteristics

To assess whether the HoE depends on the product category (utilitarian vs. hedonic) and the

brand-level characteristics (brand differentiation and market share), we conduct a second-

stage analysis with the three moderators as independent variables. For each sequence, we

estimate brand-level logit regressions, where the dependent variable is whether the brand

follows the specific sequence or not. Equations 6 and 7 present the logit specifications, where

for each brand i, y_i takes the value of 1 if the brand follows the sequence and 0 otherwise. For

example, if brand i follows the ACE sequence (Model 13), y_i takes the value of 1 for the ACE

sequence and 0 for the other 12 sequences, and *Hedonic$_i$*, *Differentiation$_i$*, and *MarketShare$_i$*

capture the three moderating variables of interest. To control for other variables used in the

literature, we add (1) category involvement, (2) category expensiveness, and (3) brand trust.

In the "Robustness Check" section, we examine whether our results hold up to the inclusion

(vs. exclusion) of these category- and brand-level controls.

$$Prob(y_i = 1 | \boldsymbol{x}_i) = \frac{exp\,(\boldsymbol{x}_i\boldsymbol{\theta})}{1 + exp\,(\boldsymbol{x}_i\boldsymbol{\theta})}. \qquad (6)$$

$$\boldsymbol{x}_i\boldsymbol{\theta} = \theta_1 Hedonic_i + \theta_2 Differentiation_i + \theta_3 MarketShare_i + Controls. \quad (7)$$

Data

We obtain data from two sources. First, Kantar Worldpanel's brand performance tracker

includes consumer attitude metrics, purchases, and marketing-mix data between January 2003

and July 2010 on a four-week basis at the brand level for all brands in 18 product categories

in France. We analyze all brands present throughout the entire observation period. Thus, we

have a complete set of 98 time-series observations per measure across brands. Table 3 details

the empirical measures and their operationalization.

--- Insert Table 3 around here ----

For consumer mindset metrics, a nationally representative panel of households is surveyed weekly with a rotation method, such that a given household is only interviewed at most once a year about a given product category. This ensures that the previous survey does not influence a respondent's answers on a new survey for a given product. The brand performance tracker reports four-week averages of the responses for each metric (more than 8,000 surveys are conducted each year for each category in France). Brand managers receive these metrics to track the performance of their brands in the purchase funnel. We use these metrics to measure the three intermediate factors. For cognition, we average the metrics of advertising awareness and aided brand awareness because they capture the "thinking" dimension. For affect, we use the metric liking because it describes the "feeling" dimension. For experience, we average the metrics of purchase intentions and past purchase because they capture consumers' "memories" of previous interactions with the brand. All metrics are expressed as percentages of respondents, except for degree of liking, which is expressed as an average score across respondents obtained from a 7-point Likert scale. We normalize all variables for the empirical application.

We use three other metrics from the brand performance tracker in the second-stage analysis, with brand differentiation and market share as the two moderators of interest and brand trust as the control. In addition, we calculate and use category expensiveness as a control by computing the market share–weighted average of the maximum prices of all brands in the category (Raju 1992). We measure purchase data with a nationally representative household panel (12,000 households in France) using hand-held scanner device information. Finally, we obtained advertising expenditure and brand prices and promotions from Kantar Worldpanel.

Our second data source is a survey among an online panel that we interviewed to measure the utilitarian or hedonic nature (moderator of interest) and involvement (control variable) with each of the 18 categories. Our sample of 100 French respondents is stratified on the basis of sociodemographic criteria. The survey instruments are the Ratchford (1987) scales translated into French. Each respondent answered the survey for ten categories to minimize respondent fatigue (see Web Appendix W2 for survey measurement details).

Our sample consists of 178 brands in the categories of beer, candy, canned meals, cereal, cleaning, coffee, detergent, facial cream, feminine hygiene, frozen meals, makeup, milk, snack, shampoo, shaving, shower, soft drink, and yogurt. These brands represent a mix of food and nonfood categories, storables and perishables, and necessities and discretionary items, allowing us to generalize our findings across FMCG categories. Table 4 provides descriptive statistics averaged across brands on all variables (see Web Appendix W3 for correlations between variables). Overall, with a temporal duration of seven years and a wide coverage of brands across 18 consumer product categories, the data are uniquely suited to address our research objective to identify the operating HoE framework, its generalizability, the intermediate factor sequences, and the impact of moderating variables.

--- Insert Table 4 around here ----

Results

For model stability, we confirm that the roots of the autoregressive polynomial are inside the unit circle. Moreover, the models show no violation of autocorrelation or heteroskedasticity (Franses 2005).[2]

Is There a HoE in Advertising?

For each brand, we uncover the operating HoE framework by identifying the model that best fits the data in each framework—classical, simultaneous, and integrated—and then compare the chosen three models to evaluate which framework describes the brand best. For illustration, we display for a snack brand the comparisons among models and estimates in Panels A and B of Table 5, respectively. We compare the model fit statistics of Model 13 (the best model of the integrated HoE framework) with those of Model 6 (the best model of the classical HoE framework) and Model 7 (the simultaneous framework). We find that the integrated HoE is the operating framework for the snack brand, as it statistically outperforms the other two frameworks.

--- Insert Table 5 about here ---

Overall, for 94% of the brands (168 of 178), one of the integrated HoE sequences is statistically superior, while for 3% of the brands (6 of 178), one of the classical HoE sequences is statistically superior. For the remaining 2% of brands (4 of 178), two sequences of the integrated and classical models are statistically indistinguishable but are superior to the simultaneous model. The simultaneous model does not operate for any of the 178 brands in our sample. (Web Appendices W4 and W5 present the fit criteria and estimation coefficients for all models.) In testing this relationship, we find that the integrated HoE is the predominant model ($z = 17.28$, $p < .01$). Thus, we find that the integrated HoE is the operating framework across brands and categories in FMCGs, with 94% of the brands operating with this framework. We conclude that the HoE is the operating framework for describing the sequence from advertising effects through intermediate factors to purchases.

Is There a Predominant HoE Sequence in Advertising?

Next, we compare the incidence of sequences of the intermediate factors in the HoE framework. This involves five pairwise fit comparisons among models within the integrated HoE. For our illustrative snack brand, we compare Model 13 with Models 8–12 (Table 5,

Panel A). We find that Model 13 with the ACE sequence is the predominant sequence because it statistically outperforms the other sequences.

Overall, we find that for 90 of the 178 brands (52%), one model is statistically superior to all other models in the framework. Among these 90 brands with an identifiable best model, Model 13 with the ACE sequence operates for 42% (38) of the brands (Table 6). Thus, ACE is the most predominant hierarchical sequence. In distant second and third place are the CEA and AEC sequences (Models 9 and 12), which operate for 19% (17) and 17% (15) of the brands, respectively. In the "Robustness Check" section, we show that the ACE sequence is also predominant for the 88 brands for which a single statistically superior model is not identified.

--- Insert Table 6 around here ----

Do Hedonic Nature, Differentiation, and Market Share Moderate the HoE Sequence?

As noted previously, the brands differ in the HoE operating sequence. Following our conceptual framework, we conduct a second-stage analysis to explore how hedonic nature, brand differentiation, and market share moderate the sequence.

Table 7 reports the estimations for Equations 6 and 7. We find that the presence of Model 13, which is the predominant operating ACE sequence, has a negative relationship to the hedonic nature of the product and brand differentiation (-2.48, $p < .05$; $-.24$, $p < .05$, respectively). Therefore, we conclude that the ACE sequence is even more likely to occur for utilitarian products and less differentiated brands.

--- Insert Table 8 around here ----

Robustness Check

We perform several robustness checks to assess the validity of our results. First, we adapt our models to treat the marketing variables as endogenous. Second, we examine the operating framework and sequence for the brands without a superior model. Third, we evaluate whether

our results are robust for brands with low market share (<1%). Fourth, we assess the robustness of the second-stage analysis to the inclusion of control variables. Finally, we check the robustness of our results to DFM estimation.

Endogenous marketing variables. In our model specification and main analysis, we follow HoE frameworks (BPN; V&A) that consider advertising and marketing exogenous. However, we check the robustness of our results to treating all three marketing variables (advertising, price, and promotion) as endogenous. We adapt our model specifications to accommodate eight endogenous variables instead of five. The results confirm the main results that the HoE framework operates across all brands and that the ACE sequence is predominant.[3]

Operating sequence for brands without a best model. Of the 88 brands for which no single model was statistically superior, 63 have two models that outperform the other 11 models but are indistinguishable from each other. For 35 (56%) of these 63 brands, one of the two superior models is the ACE sequence. Next, 11 brands have three models that are statistically superior to the rest but are indistinguishable from one another. Of these 11 brands, 6 (55%) have the ACE sequence as one of the three superior models. Finally, 14 brands have four or more models that are statistically superior to the rest but are indistinguishable from one another. Of these 14 brands, 10 (71%) have the ACE sequence as one of the superior models. Thus, we conclude that the predominance of the ACE sequence extends to all brands.

Brands with low market share. While we find that market share is a moderator, a question remains whether our results would hold up for small brands that have had little opportunity to build experience at the market level. Slotegraaf and Pauwels (2008) call attention to the implicit focus of prior marketing effectiveness research on large brands and find different results for small brands (under 3%) in their analysis of 100 brands in seven

categories. Our data set contains an even wider range of market share, from .00% to 47.65% (Table 4), with 26 (15%) brands with a market share below 1%. The robustness analyses confirm that our main results (HoE nature and dominant sequence) hold both for the group of brands with more than 1% and for the group of brands with market share below 1%.[4]

Inclusion of controls in examining the moderators of the HoE sequence. In the second-stage analysis we find that the hedonic nature of the category, brand differentiation, and market share moderate the HoE sequence. To evaluate the robustness of these results to the inclusion of different control variables, in Equation 7 we include the three control variables described previously: category involvement, category expensiveness, and brand trust. The results of the logit regressions confirm that the ACE sequence is even more likely to occur for utilitarian products and less differentiated brands (see Web Appendix W6).

DFMs. We assess the robustness of our results to the use of DFMs as in BPN for a subset of brands. DFMs are flexible in linking the observed metrics to unobservable constructs; however, their flexibility typically raises convergence problems (Stock and Watson 2010). To obtain convergence, we searched for a suitable optimization algorithm and appropriate starting values to achieve estimation convergence, which required several interventions at the individual-model estimation process.This labor-intensive process took multiple days for each brand and model to find an appropriate intervention. Despite this, some models did not fully converge. For the fully converging brands, we find the same results as our main analysis; that is, the integrated HoE is the dominant framework and ACE the predominant sequence.

Managerial Implications

Our findings reveal robust support for the HoE framework across all brands and for specific hierarchical sequences for different brands, with the ACE sequence being the predominant one. To what extent then are these findings important for managers? We address this question in two ways by showing (1) which intermediate factor is the most important in driving brand sales and (2) which factor has the greatest responsiveness to advertising. From a managerial standpoint, identification of the correct HoE model can help brand managers assess the impact of cognition, affect, and experience on sales and evaluate their responsiveness to advertising.

Importance of the Intermediate Factors in Driving Sales

To advise managers on which intermediate factor is the most important in driving sales over time, we compute the long-term (32 weeks) forecast error variance decomposition (FEVD) (Joshi and Hanssens 2010).[5] The FEVD decomposes how much of the variation of an endogenous variable of interest—sales in our application—is explained by changes in other endogenous variables of interest in the system—cognition, affect, and experience. Similar to the dynamic R-square, the FEVD quantifies the dynamic explanatory value on sales of each endogenous variable. Because our model imposes a causal structure to advertising and intermediate factors, we perform a Cholesky FEVD (Lutkepohl 2005).

Figure 2 shows the importance of each intermediate factor in driving sales, organized by the HoE sequence. Overall, we find that the last factor in the sequence is the most important in driving sales, followed by the middle factor, and then the first factor: The last factor in the sequence explains 56% of the sales variation, while the middle and first factors explain 27% and 16%, respectively. This pattern holds for all sequences except ECA, in which the last factor (affect) explains 42% of the variation and the middle factor (cognition) 45%. For the predominant ACE sequence, , the last, middle, and first factors explain 44%, 43%, and 13% of the sales variation, respectively.

--- Insert Figure 2 around here ----

Responsiveness of the Intermediate Factors to Advertising

Managers also need to assess the extent to which advertising moves the needle on cognition, affect, and experience. To this end, we collect the estimated coefficients, from the operating model, that capture the effects of advertising on the intermediate factors.

For the 90 brands with a dominant HoE sequence, we collect the coefficients of the operating model and their standard errors. For the remaining 88 brands without a dominant operating sequence, we average the coefficients and obtain the pooled standard errors for the top models that are statistically undistinguishable. As Panel A of Figure 3 shows, there is large variation in responsiveness. Cognition, affect, and experience have a mean elasticity to advertising of .031, .036, and .026, respectively. Collectively, we find that all three intermediate factors respond positively to advertising but that advertising moves the needle the most on affect.

--- Insert Figure 3 about here --

To ease comparison, we group brands by their HoE sequence. Panel B of Figure 3 shows the average response to advertising by sequence. First, focusing on the top three sequences, responsiveness to advertising is highest for affect for brands with the ACE, CEA, and AEC sequences. Second, response of experience to advertising is highest for the three remaining sequences: ECA, EAC, and CAE.

In summary, knowing their brands' HoE can help managers not only understand which intermediate factor is most important in driving sales but also how much each of them responds to advertising. In combination, our findings provide managers actionable ways to leverage the HoE framework to drive sales.

Discussion

Although the HoE model has received considerable attention by both academics and practitioners, empirical evidence of the hierarchy or alternative hierarchies for advertising effects has been lacking. Our study addresses this gap by analyzing how the factors of cognition, affect, and experience mediate advertising effects on sales using data for 178 FMCGs in 18 categories over seven years.

Several new findings emerge from our work. First, the integrated HoE model holds up well, signifying an operating sequence for each brand. Thus, we conclude the HoE as conceptual framework is validated empirically, at least for FMCG. Importantly, the HoE sequence varies across brands, with the predominant one being the ACE sequence. V&A conclude that there is little support for any hierarchy in the sense of a temporal sequence, because they encounter conflicting results in their review of the literature. Given the literature available at the time, with its lack of direct evidence of the concept of sequence, their framework provided a compromise in light of conflicting results. Now, with the longitudinal mindset metrics data sets at our disposal, we show that the V&A model is dominated by other models, which are hierarchical, in terms of fit with the data for all studied brands. The classical HoE, which in its original formulation proposed a CAE sequence, does not find support in our analysis, while notably the integrated HoE finds strong support.

While different sequences operate for different brands, the predominant one is the ACE sequence, and its incidence is greater for utilitarian products and less differentiated brands. Moreover, we find that cognition preceding affect in the operating HoE sequence is more likely to occur for hedonic categories, differentiated brands, and brands with higher market share. These findings offer brand managers easily identified conditions for which each sequence is more likely.

Having established the operating hierarchical sequence for brands, we provide insight for managers into which intermediate factor is the most important in driving sales. The last factor in the sequence has the greatest importance in driving sales, followed by the middle and first (56%, 27%, and 16%, respectively). By applying our approach, managers can also develop actionable guidelines on how to move the needle on the intermediate factors. As noted previously, for the top three sequences, affect responsiveness to advertising is highest for brands with the ACE, CEA, and AEC sequences. Importantly, all three intermediate factors (cognition, affect, and experience) respond positively to advertising with mean elasticities of .031, .036, and .026, respectively. Taken together, these findings offer managers insights into advertising expenditure and copy content that influence all three intermediate factors to eventually result in long-term sales lift.

Limitations of our study suggest useful directions for further research. The classical HoE was originally developed for new brands, while our data set consists of existing brands in mature FMCG categories. Further research could aim to collect data on newer brands (e.g., "challenger" or "disruptor" brands) and compare their HoE sequence with that of established brands. Other data limitations include the lack of unexplored market, company, and additional brand factors that may influence the studied effects. We encourage researchers to examine potential drivers such as economic and cultural market differences (Pauwels, Erguncu, and Yildirim 2013), the company's market sensing, brand management and customer relationship management capabilities (Morgan, Slotegraaf, and Vorhies 2009), and the quality of the brand experience, as captured in, for example, online reviews and offline word-of-mouth conversations (Fay et al. 2017).

Although our work provides support for the HoE, we note the complexity of the integrated HoE models that receive the strongest statistical support. Advertising not only operates through the mindset but also has a direct effect on sales, which may indicate that the

available metrics do not fully capture the more immediate factor effects of advertising and/or that advertising leverages the existing mindset without necessarily changing it in a measurable way (Srinivasan, Vanhuele, and Pauwels 2010). In addition, each of the intermediate factors exhibits dynamics, meaning that they are influenced by their previous states. We also observe purchase reinforcement for all three intermediate factors. Therefore, the HoE as currently taught, even if variations in the sequence are acknowledged, is a simplified model. The time has come in today's data-rich world to change the way the HoE model is presented in marketing courses. Only in its full complexity can it attain relevance.

While our research demonstrates that the integrated HoE is relevant as a framework to guide advertising decision-making, its operationalization is more challenging than previously believed. Given the complex interactions among the intermediate factors, we encourage brand managers to investigate the operating hierarchy for their brands and the actionable recommendations that arise from this knowledge. We urge academics and practitioners to incorporate the integrated HoE model in their theoretical and empirical investigations of advertising and to consider its potential value in understanding advertising effects.

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[2] These results are available from the authors on request.

[3] The results are available from the authors on request.

[4] The results are available from the authors on request.

[5] We chose 32 weeks since it is the longest period possible for FEVD analysis in the software program, Stata.

TABLE 1
Comparison with Extant Papers on the HoE

	HoE Model			Operating Sequence	Brand and Category Moderators	Factor Responsiveness to Advertising	Sales Conversion of Intermediate Factors	Empirical Generalization
	Classical	Simultaneous	Integrated					
Colley (1961)	✓							
Lavidge and Steiner (1961)	✓							
Palda (1966)	✓							
Vaughn (1980, 1986)	✓				✓			✓
Ratchford (1987)	✓				✓			✓
Barry and Howard (1990)	✓							
V&A (1999)		✓						
Srinivasan, Vanhuele, and Pauwels (2010)		✓				✓	✓	✓
BPN (2012)	✓	✓	✓	✓				
Hanssens et al. (2014)						✓	✓	✓
This study	✓	✓	✓	✓	✓	✓	✓	✓

TABLE 2
Classical, Simultaneous, and Integrated HoE Model Specifications

Model	HoE Framework	Sequence	Advertising Triggers	Price and Promotion	Dynamics	Purchase Reinforcement
1	Classical	ECA	Only E	Yes	None	None
2		CEA	Only C			
3		EAC	Only E			
4		CAE	Only C			
5		AEC	Only A			
6		ACE	Only A			
7	Simultaneous	None	C, A, E	Yes	None	Only E
8	Integrated	ECA	C, A, E, Sales	Yes	C, A, E, Sales	C, A, E, Sales
9		CEA				
10		EAC				
11		CAE				
12		AEC				
13		ACE				

TABLE 3
Variables and Their Operationalization

Variable	Operationalization
Advertising	All advertising media expenditures (in euros)
Average price	Average price paid (in euros)
Promotion	Distribution-weighted average promotion in percentages
Sales volume	Sales (quantity sold)
Advertising awareness	"For which of these brands have you seen, heard, or read any advertising in the past two months?" (Respondent is given a list of brands and replies YES or NO to each) % of respondents indicating "yes" for the particular brand
Aided awareness	"Which of the following brands have you heard of?" (Respondent is given a list of brands and replies YES or NO to each) % of respondents indicating "yes" for the particular brand
Liking	"Please indicate how much you like brand X." (1 = "I don't like at all," 7 = "I like a lot")
Past purchase	"Which of these brands have you purchased in the past?" (Respondent is given a list of brands and replies YES or NO to each) % of respondents indicating "yes" for the particular brand
Purchase intention	"Which of these brands are you willing to buy in the future?" (Respondent is given a list of brands and replies YES or NO to each) % of respondents indicating "yes" for the particular brand
Category Hedonic nature	We obtain respondents' scores on 'feeling' and 'thinking' items and then calculate, as a continuous metric, the extent to which a category is hedonic vs. utilitarian measured as the difference between 'feeling' and 'thinking' (Ratchford 1987). Details are in Web Appendix W2.
Category involvement	We obtain respondents' scores on 'involvement' items and then calculate a continuous metric of 'involvement' (Ratchford 1987). Details are in Web Appendix W2.
Brand differentiation	"Is the brand differentiated?" (Respondent is given a list of brands and replies YES or NO to each) % of respondents indicating "yes" for the particular brand
Brand market share	Market share in value
Brand trust	"Do you trust the brand?" (Respondent is given a list of brands and replies YES or NO to each) % of respondents indicating "yes" for the particular brand
Category expensiveness	Market share–weighted average of the maximum prices of all brands in the category (Raju 1992)

TABLE 4
Variables: Definition and Descriptive Statistics

Variable	Definition	M	SD	Min.	Max.
Sales	Sales in volume or weight (100 households)	12.50	26.95	0.00	213.76
Marketing	Advertising (in thousand euros)	451.12	860.61	0.00	10,745.00
	Average price (in euros)	3.55	5.37	0.05	56.56
	Promotion (%)	30.21	22.12	0.00	96.72
Mindset metrics	Ad awareness (%)	17.97	11.11	0.07	62.03
	Aided awareness (%)	81.05	15.35	10.99	100.00
	Liking (1 to 7)	5.64	0.67	2.91	7.00
	Purchase intention (%)	5.71	5.29	0.05	48.65
	Purchase past (%)	19.30	12.20	0.12	85.55
Moderators	Hedonic nature (–7 to 7)	-0.18	0.23	-0.65	0.20
	Differentiation (%)	11.58	5.65	1.12	39.16
	Market Share (%)	4.77	5.17	0.00	47.65
Control Variables	Involvement (1 to 7)	3.01	0.18	2.69	3.36
	Trust (%)	34.55	7.44	14.90	66.31
	Category expensiveness (in euros)	4.17	5.22	0.18	19.19

Notes: Average across brands and periods.

TABLE 5
Estimates for an Illustrative Brand in the Snack Category

A: Model Comparison: Classical, Simultaneous, and Integrated HoE

Model	HoE Framework	Sequence	LL	AIC	BIC
1		ECA	-476.9	977.8	1,008.8
2		CEA	-476.4	976.9	1,007.9
3	Classical	EAC	-478.1	980.2	1,011.2
4		CAE	-474.3	972.6	1,003.6
5		AEC	-471.5	967.0	998.1
6		ACE	-470.1	964.1	995.1
7	Simultaneous	None	-457.5	945.0	983.8
8		ECA	-402.5	849.1	905.9
9		CEA	-394.1	832.2	889.0
10	Integrated	EAC	-398.7	841.4	898.2
11		CAE	-397.5	839.1	896.0
12		AEC	-400.0	843.9	900.8
13		ACE	**-390.2**	**824.3**	**881.2**

B: Model Estimates for the ACE Sequence Model

$$
\begin{bmatrix} C_t \\ A_t \\ E_t \\ S_t \end{bmatrix} = \begin{bmatrix} \mathbf{.748} & -.074 & 0 & .0914 \\ 0 & \mathbf{.367} & 0 & \mathbf{.312} \\ \mathbf{.431} & 0 & \mathbf{.186} & \mathbf{.473} \\ 0 & 0 & \mathbf{.265} & \mathbf{.574} \end{bmatrix} \begin{bmatrix} C_{t-1} \\ A_{t-1} \\ E_{t-1} \\ S_{t-1} \end{bmatrix} + \begin{bmatrix} .053 & -\mathbf{.151} & -\mathbf{.135} \\ \mathbf{.266} & .130 & -\mathbf{.224} \\ \mathbf{.171} & .008 & -\mathbf{.336} \\ -.023 & .103 & -.038 \end{bmatrix} \begin{bmatrix} Adv_{t-1} \\ Price_{t-1} \\ Promo_{t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ v_{3t} \\ v_{4t} \end{bmatrix}
$$

Notes: In Panel A, criteria (LL [log-likelihood], AIC, BIC) significantly superior to other models are in bold. In Panel B, significant coefficients are in bold. Web Appendices W4 and W5 present the fit criteria and the model estimates for all brands.

TABLE 6
Incidence of HoE Sequences

Model	Hierarchy	Sequence	Frequency (# of Brands)	% (of Brands)
1	Classical	ECA	1	1%
2		CEA	3	3%
3		EAC	0	0%
4		CAE	0	0%
5		AEC	0	0%
6		ACE	0	0%
7	Simultaneous	None	0	0%
8	Integrated	ECA	6	7%
9		CEA	17	19%
10		EAC	4	4%
11		CAE	6	7%
12		AEC	15	17%
13		ACE	38	42%

TABLE 7
Logit Regression Estimation Results on Moderating Effects of the HoE Sequence

| Category and Brand Moderators	Dependent Variable (Model/HoE Sequence)					
	ECA	CEA	EAC	CAE	AEC	ACE
Hedonic nature	4.74 (3.18)	0.28 (1.21)	-2.21 (2.31)	1.79 (2.11)	1.23 (1.33)	-2.48** (1.16)
Brand differentiation	0.22** (0.09)	0.04 (0.05)	0.21** (0.09)	0.03 (0.08)	0.00 (0.05)	-0.24** (0.07)
Brand market share	0.15 (0.10)	0.02 (0.05)	-0.32 (0.34)	-0.07 (0.12)	-0.02 (0.06)	-0.08 (0.05)
Constant	-5.91** (1.70)	-1.90** (0.70)	-5.47** (1.77)	-2.47** (1.03)	-1.37* (0.71)	1.83** (0.73)
Observations	90					
Log- likelihood	-14.233	-43.199	-12.171	-21.198	-39.963	-48.629
Pseudo-R^2	0.354	0.010	0.256	0.038	0.015	0.207

Notes: Standard errors are in brackets, ** Coefficients at $p < .05$, * Coefficients at $p < .1$. Variables in the model are normalized.

FIGURE 1
Conceptual Framework: Integrated HoE Framework for ACE Sequence
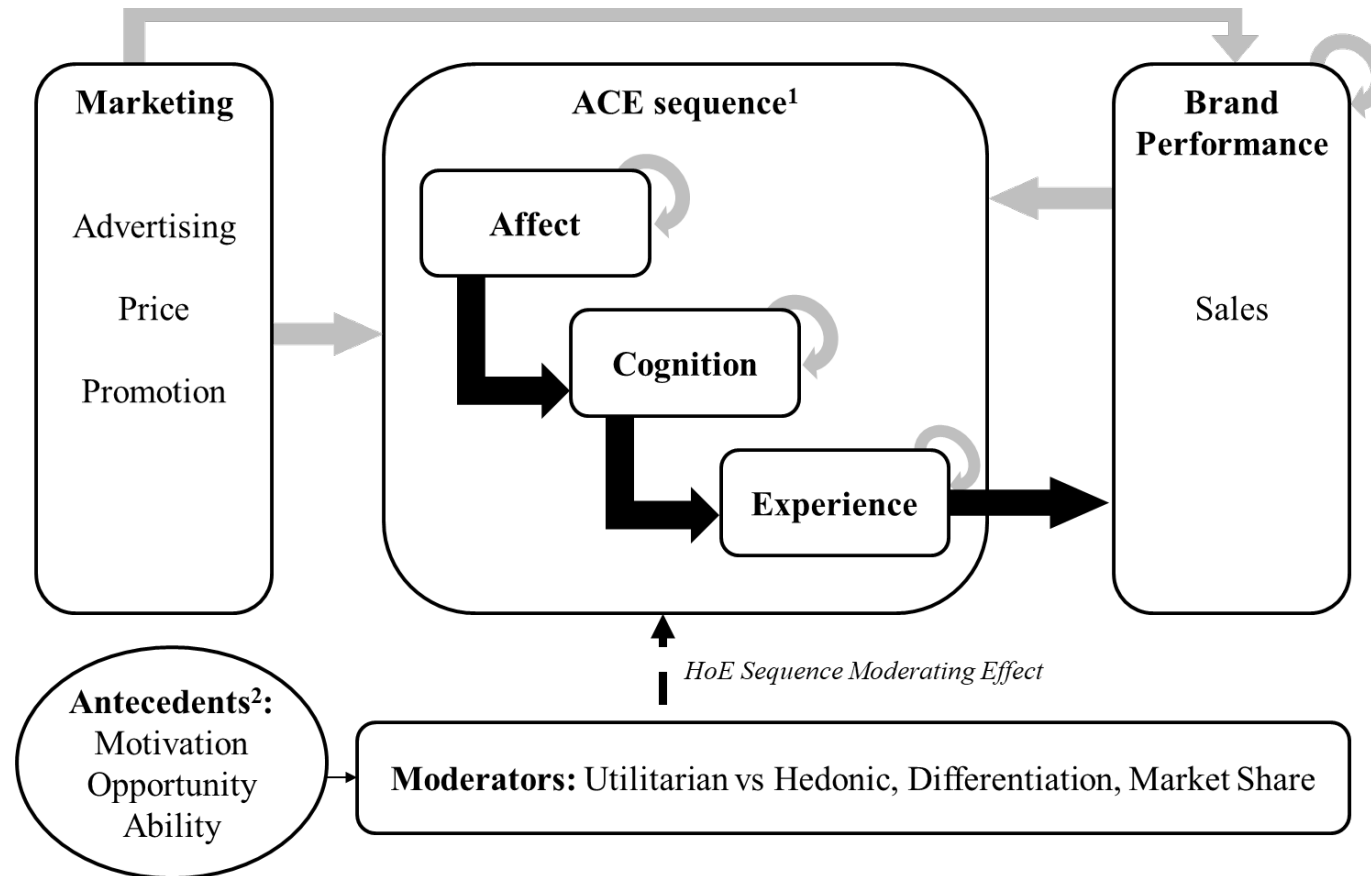
Notes: Subscript 1 is based on CEST by Epstein (1993), and subscript 2 is based on the integrative framework of information processing from advertisements by MacInnis and Jaworski (1989). The black lines and arrows show the relationships that consider the HoE sequence: The solid black arrows show the relationships that capture the HoE sequence of the intermediate factors, and the dashed black arrow shows the effect of the moderators (utilitarian vs. hedonic, differentiation, and market share) on the HoE sequence. The solid gray arrows denote purchase reinforcement, intermediate factor and sales dynamics, and marketing effects on sales and intermediate factors.

FIGURE 2
**Importance of First, Middle, and Third Factor for Each HoE Sequence in Driving Sales**
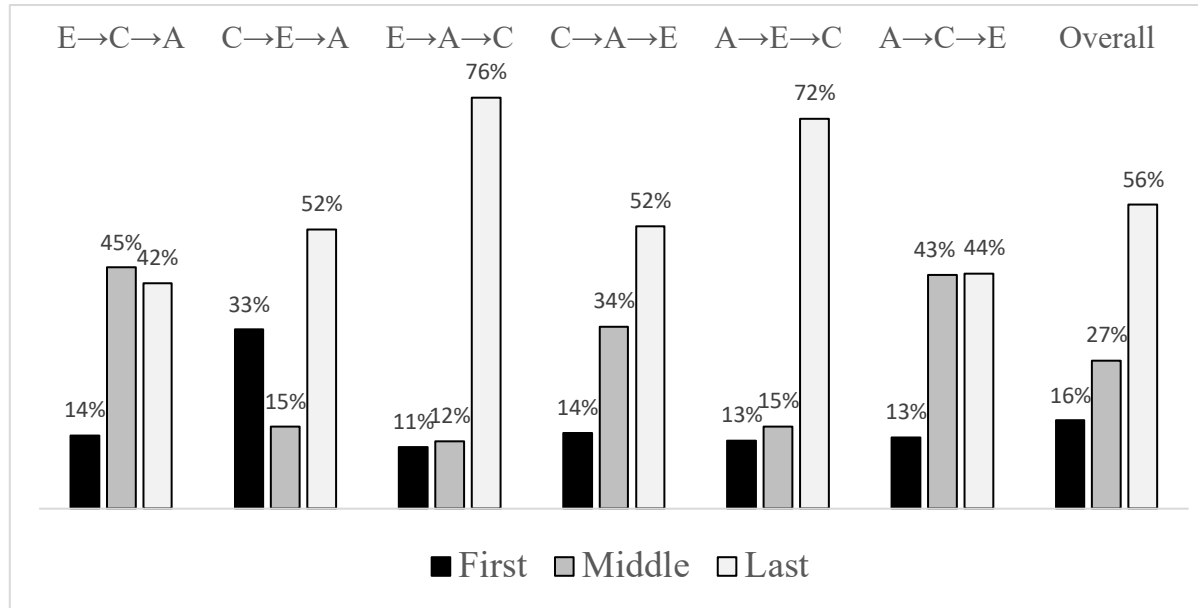
Note: the figure presents the relative importance among cognition, affect, and experience, excluding the effect of past sales with long-term FEVD estimates.

FIGURE 3
Responsiveness of Intermediate Factors to Advertising

A: Distribution of Responsiveness of Intermediate Factors to Advertising
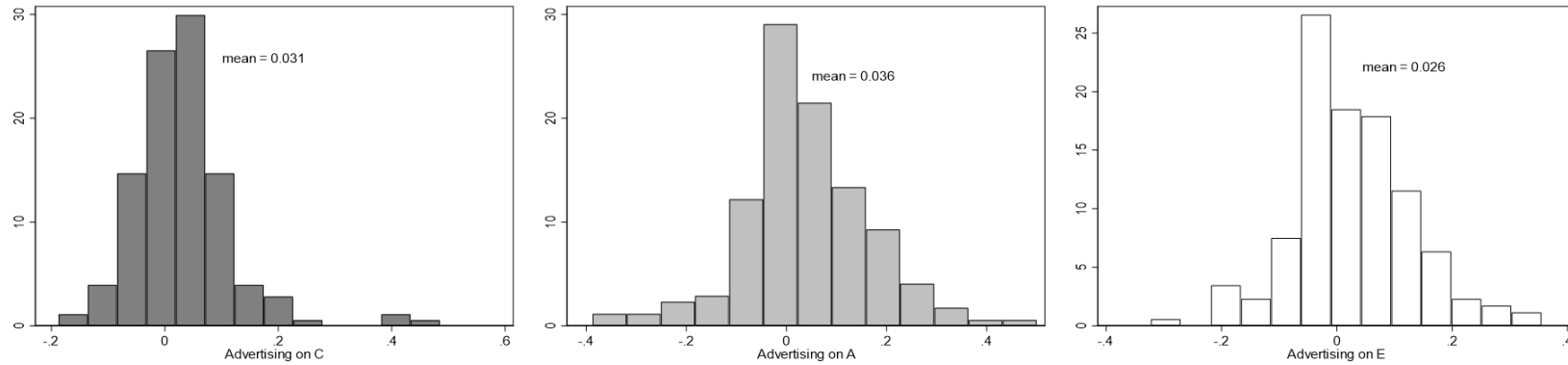
B: Responsiveness of the Intermediate Factors to Advertising for each HoE Sequence
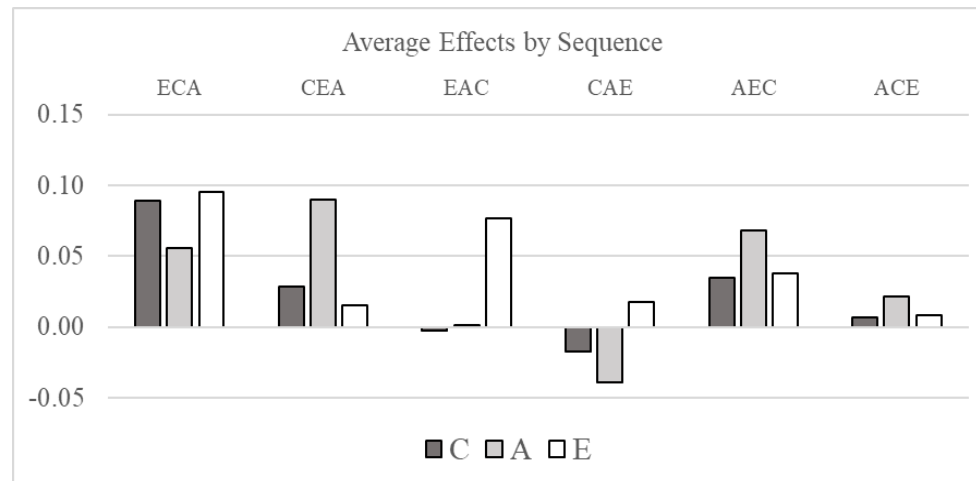
Note: In panel B, for brands with ECA sequence, the responsiveness of cognition, affect, and experience to advertising is .09, .06, and .9, respectively.