2019-2020 Marketing Seminars

This year the Wisconsin School of Business’ Marketing Department is inviting doctoral candidates to come and present their research to our school.

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Omid Rafieian, Doctoral Student, University of Washington

**Optimizing User Engagement through Adaptive Ad Sequencing**

*Synopsis*

Mobile in-app advertising has grown exponentially in the last few years. In-app ads are often shown in a sequence of short-lived exposures for the duration of a user’s stay in an app. The current state of both research and practice ignores the dynamics of ad sequencing and instead adopts a myopic framework to serve ads. In this paper, we propose a unified dynamic framework for adaptive ad sequencing that optimizes user engagement in the session, e.g., the number of clicks or length of stay. Our framework comprises of two components – (1) a Markov Decision Process that captures the domain structure and incorporates inter-temporal trade-offs in ad interventions, and (2) an empirical framework that combines machine learning methods such as Extreme Gradient Boosting (XGBoost) with ideas from the causal inference literature to obtain counterfactual estimates of user behavior. We apply our framework to large-scale data from the leading in-app ad-network of an Asian country. We document significant gains in user engagement from adopting a dynamic framework. We show that our forward-looking ad sequencing policy outperforms all the existing methods by comparing it to a series of benchmark policies often used in research and practice. Further, we demonstrate that these gains are heterogeneous across sessions: adaptive forward-looking ad sequencing is most effective when users are new to the platform. Finally, we use a descriptive approach to explain the gains from adopting the dynamic framework.

**Revenue-Optimal Dynamic Auctions for Adaptive Ad Sequencing**

*Synopsis*

Digital publishers often use real-time auctions to allocate their advertising inventory. These auctions are designed with the assumption that advertising exposures within a user’s browsing or app-usage session are independent. Rafieian (2019) empirically documents the interdependence in the sequence of ads in mobile in-app advertising, and shows that dynamic sequencing of ads can improve the match between users and ads. In this paper, we examine the revenue gains from adopting a revenue-optimal dynamic auction to sequence ads. We propose a unified framework with two components – (1) a theoretical framework to derive the revenue-optimal dynamic auction that captures both advertisers’ strategic bidding and users’ ad response and app usage, and (2) an empirical framework that involves the structural estimation of advertisers’ click valuations as well as personalized estimation of users’ behavior using machine techniques. We apply our framework to large-scale data from the leading in-app ad-network of an Asian country. We document significant revenue gains from using the revenue-optimal dynamic auction compared to the revenue-optimal static auction. These gains stem from the improvement in the match between users and ads in the dynamic auction. The revenue-optimal dynamic auction also improves all key market outcomes, such as the total surplus, average advertisers’ surplus, and market concentration.
Tesary Lin, Doctoral Student, University of Chicago

Valuing Intrinsic and Instrumental Preferences for Privacy

Synopsis

In this paper, I propose a framework for understanding why and to what extent people value their privacy. In particular, I distinguish between two motives for protecting privacy: the intrinsic motive, that is, a “taste” for privacy; and the instrumental motive, which reflects the expected economic loss from revealing one’s “type” specific to the transactional environment. Distinguishing between the two preference components not only improves the measurement of privacy preferences across contexts, but also plays a crucial role in developing inferences based on data voluntarily shared by consumers. Combining a two-stage experiment and a structural model, I measure the dollar value of revealed preference corresponding to each motive, and examine how these two motives codetermine the composition of consumers choosing to protect their personal data. The compositional differences between consumers who withhold and who share their data strongly influence the quality of firms’ inference on consumers and their subsequent managerial decisions. Counterfactual analysis investigates strategies firms can adopt to improve their inference: Ex ante, firms can allocate resources to collect personal data where their marginal value is the highest. Ex post, a consumer’s data-sharing decision per se contains information that reflects how consumers self-select into data sharing, and improves aggregate-level managerial decisions. Firms can leverage this information instead of imposing arbitrary assumptions on consumers not in their dataset.

Matt McGranaghan, Doctoral Student, Cornell University

Watching People Watch TV

Synopsis

A challenge to measuring TV viewer attention is that instant access to social media, news, and work has raised the opportunity cost of engaging with TV ads. The result may be a significant difference between traditional engagement measures, e.g., tuning, and measures which can capture more nuanced avoidance behaviors. This paper asks two questions relating to viewer behavior in the context of TV advertising. First, how do traditional TV tuning metrics relate to a novel set of viewer measures that may be more aligned with broadcasters’ and advertisers’ interests? Second, what is the relationship between these new measures and ad content? To answer these questions, we leverage novel, in-situ, audience measurement data that use facial and body recognition technology to track tuning, presence (in room behavior), and attention for a panel of 6,291 viewers and 8,465,513 ad impressions, as well as consider four different classifications of advertising content based on human and machine-coded features. We find meaningful differences in the absolute levels and dynamics of these behaviors, and can identify ad content for which viewers are systematically more likely to change the channel, leave the room, and stop paying attention. Such ads reduce the pool of attention to subsequent advertisers as well as the platform itself, a negative externality. We quantify these spillover effects for the publisher by conducting a series of counterfactual simulations, and find that requiring advertisers to improve their content can result in significant increases in the cumulative levels of viewer tuning, in-room presence, and attention.

Cheng He, Doctoral Student, Georgia Institute of Technology

The End of the Express Road for Hybrid Vehicles: Can Governments’ Green Product Incentives Backfire?

Synopsis
In response to growing environmental concerns, governments have promoted products that are less harmful to the environment—green products—through various incentives. We empirically study the impact of a commonly used non-monetary incentive, namely the single-occupancy permission to high-occupancy vehicle (HOV) lanes, on green and non-green product demand in the U.S. automobile industry. The HOV incentive could increase unit sales of green vehicles by enhancing their functional value through time-saving. On the other hand, the incentive may prove counterproductive if it reduces the symbolic value (i.e., signaling a pro-environmental image) consumers derive from green vehicles. Assessing the effectiveness of green-product incentives is challenging given the endogenous nature of governments’ incentive provisions. To identify the effect of the HOV incentive on unit sales of green and non-green vehicles, we take advantage of incentive changes at the county level, and we employ a multitude of quasi-experimental methods, including difference-in-differences with Coarsened Exact Matching, border strategy, and regression discontinuity in time. Unlike previous studies that only examine the launch of the HOV incentive and find an insignificant association between incentive launch and green vehicle demand, we concentrate on its termination. We find that the termination of the HOV incentive decreases unit sales of vehicles covered by the incentive by 14.4%. We provide suggestive evidence that this significant negative effect of HOV incentive termination is due to the elimination of the functional value the incentive provides: time-saving. Specifically, we find that the negative effect is more pronounced in counties where consumers value time-saving more (i.e., counties with a longer commute to work and higher income). Additionally, in line with prior literature, the launch of the HOV incentive is not found to have a significant effect on green vehicle sales. Combined, our findings reveal that the effect of termination is not simply the opposite of that of launch, implying that governments’ green product incentives could backfire.

**Keywords:** sustainability, green products, public policy, government incentives, climate change, technology adoption, policy evaluation, quasi-experiments, difference-in-differences, coarsened exact matching

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**Alex Burnap, Doctoral Student, MIT Sloan School of Management**

**Design and Evolution or Product Aesthetics: A Human-Machine Hybrid Approach**

**Synopsis**

Aesthetics are critically important to market acceptance in many product categories. In the automotive industry in particular, an improved aesthetic design can boost sales by 30% or more. Firms invest heavily in designing and testing new product aesthetics. A single automotive “theme clinic” costs between $100,000 and $1,000,000, and hundreds are conducted annually. We use machine learning to augment human judgment when designing and testing new product aesthetics. The model combines a probabilistic variational autoencoder (VAE) and adversarial components from generative adversarial networks (GAN), along with modeling assumptions that address managerial requirements for firm adoption. We train our model with data from an automotive partner — 7,000 images evaluated by targeted consumers and 180,000 high-quality unrated images. Our model predicts well the appeal of new aesthetic designs — 38% improvement relative to a baseline and substantial improvement over both conventional machine learning models and pretrained deep learning models. New automotive designs are generated in a controllable manner for the design team to consider, which we also empirically verify are appealing to consumers. These results, combining human and machine inputs for practical managerial usage, suggest that machine learning offers significant opportunity to augment aesthetic design.

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**Tommaso Bondi, Doctoral Student, New York Stern School of Business**

**Alone, Together: Product Discovery Through Consumer Ratings**

**Synopsis**

Consumer ratings have become a prevalent driver of choice. I develop a model of social learning in which ratings can inform consumers about both product quality and their idiosyncratic taste for them. Depending on consumers’ prior knowledge, I show that ratings relatively advantage lower quality and more polarizing products. The reason lies in the stronger positive consumer self-selection these products generate: to buy them despite their deficiencies, their buyers must have a strong taste for them. Relatedly, consumer ratings should not be used to infer product design: what is polarizing ex-ante needs not be so among its buyers. I test these predictions using Goodreads book ratings data, and find strong evidence for them. Moreover, social learning appears to serve mostly a matching purpose: tracking the behaviour of Goodreads users over time shows that they specialize as they gather experience on the platform: they rate books with a lower average and number of ratings, while focusing on fewer genres. Thus, they become less similar to their average peer. Taken together, the findings suggest that consumer ratings contribute to both the long tail and, relatedly, consumption segregation. For managers, this illustrates, counterintuitively, the reputational benefits of polarizing products, particularly early in a firm’s lifecycle, but only when paired with the ability to match with the right consumers.
The good, The Bad and The Picky: Consumer Heterogeneity and The Reversal of Movie Ratings

We explore the consequences of consumer heterogeneity on online word of mouth. Consumers differ in their experience, which has two effects. First, experience is instrumental to choice: experts purchase and review better products than non-experts. Second, because of their superior choices, experts endogenously form higher expectations, and thus post more stringent ratings given quality. Combined, these two forces imply that the better the product, the higher the standard it is held to, the more stringent its rating. Thus, relative ratings are biased: low quality products enjoy unfairly high ratings compared to their superior alternatives. When this bias gets large, reputation need not be increasing in quality. The bias need not disappear, and can worsen, over time: products with unfairly high ratings mostly attract unexperienced consumers, reinforcing their advantage. We test our theory by scraping data from a well known movie ratings website. We find strong evidence for both of our hypotheses, and that this bias is quantitatively important. We then debias the ratings, and find that the new ones better correlate with the opinions of external critics.

Sam Maglio, Professor, University of Toronto Scarborough

Choice Protection for Feeling-Focused Decisions

Synopsis

Consumers live life in the present while also anticipating and choosing for the future. This everyday experience assumes that the present and the future are distinct, successive periods in time. But when do consumers think one ends and the next begins? Intuitively, 5 years forward in time departs sufficiently from right now to fall well within the future in a way that 5 seconds forward does not. The ambiguity can be illustrated in considering 5 days forward, which might be considered part of the present or as belonging to the future. This research first documents that the felt duration of the present varies naturally between individuals and also responds to interventions that manipulate it. Appraisals of the present, in turn, are shown to color far-sighted judgment and decision making using a series of incentive-compatible experiments and field studies. Specifically, seeing the present as relatively short and the future as starting sooner causes consumers to act more generously (e.g., to save money rather than spend it) in the interest of their future selves.