Understanding Dynamic Processes in Consumer Behavior

Suresh Ramanathan, University of Chicago, USA

Much of consumer behavior research relies on between-subjects designs, with data collected on many individuals but at a single point in time. Yet, psychological processes are rarely static – consumer emotions and goals change continuously, growing or decaying over time due to internal states or due to social or external factors. In this paper, we present two different ways of looking at intra-individual and inter-individual variability and the dynamics of affective and goal-driven processes using continuous time series data in the contexts of self-control/ego depletion and social interactions among friends and strangers.

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SESSION OVERVIEW

This symposium presents four methodological advances for illuminating the psychological processes underlying consumer decision making. The methodologies address two main problems. First, process data are often collected via static self-reports that distort what researchers wish to unveil, as is sometimes the case in mediation studies. Second, processes are often assumed instead of inferred from process data, which is often the case in behavioral decision theory.

The converging message of the papers in this symposium is that while reality is more complex than standard measures admit, the appropriate methodologies can both capture and clarify psychological processes. Each paper presents feasible and accessible tools that promise to provide significant leaps over conventional methods used in the consumer behavior literature. The first two papers highlight the dynamic nature of decision making. Willemsen and Johnson designed the MouselabWEB methodology and illustrate how the rich information coming out of such studies may help to set apart theories about well-known phenomena (in this case context effects). Ramanathan illustrates the wealth of information that the measurement of moment-to-moment affective changes, as measured with a joystick, may reveal about processes underlying well-known effects. Dewitte identifies criteria that a moderation-by-process design should meet before a moderation interaction can be interpreted as evidence for the hypothesized underlying process. Goldstein introduces an interactive, graphical tool for risk preference assessment that, compared to earlier techniques, allows one to more useful process information in less time.

The symposium may be of interest to experimental researchers who, because of the phenomena they tackle, struggle to find accurate process measures. Willemsen and Johnson's contribution helps researchers to illustrate the process underlying an emerging decision. This insight may help to put conflicting decision theories to the test. Ramanathan's contribution may help affect, goal, and social interaction researchers to illuminate the dynamics underlying affect, motivation, and decisions in a social context. Dewitte's contribution helps researchers to clearly specify and identify the process without measuring it. Goldstein's contribution will help risk researchers to model more complex risk decisions. The symposium may also inspire consumer researchers to apply the proposed methods to new domains in our field.

Eric Johnson will lead the discussion. Several methodological contributions to our field (e.g., Johnson 2001, JCR, Lohse and Johnson 1996, OBHDP) attest to his seminal role in the methodological advance of our field. He will critically weigh the contributions against his experience as an experimentalist interested in processes. Individual presentations will take 14 minutes, which leaves 19 minutes for discussion.

REFERENCES


EXTENDED ABSTRACTS

“The Why and When of Context Effects”

Martijn Willemsen, Eindhoven University of Technology, The Netherlands

Eric J. Johnson, Columbia University, USA

Several accounts have been proposed to explain context effects like the compromise effect and the attraction effect. Though these accounts all predict choice, they differ strongly in the underlying cognitive mechanisms. To distinguish between the accounts, we look at the process predictions that can be derived from them. Process tracing tools (like MouselabWEB (Willemsen & Johnson, 2008), the tool we used in this study) allow us to gather information acquisition data that provides us with process measures on attention (acquisition frequencies and time), comparisons (transitions between information units and dynamics (how information search changes over time). In two studies about Loss Aversion (Willemsen et al., 2008) we have applied these tools, showing that process data can help to distinguish between alternative accounts for loss aversion (reference dependence and gain-loss framing). In the current paper, we apply a similar methodology to get more insight into the cognitive processes underlying context effects.

We focus our analysis on theories that explain both attraction and compromise effects. In terms of process predictions, current accounts for context effects can be classified into two broad categories: biased and unbiased information search. One series of models predict a largely unbiased information acquisition process consisting of a large number of attribute-based comparisons. Some of these are based on loss aversion, such as the relative advantage model of Tversky and Simonson (1993) and the LAM model (Kivetz et al., 2004) which we extended to account for attraction effects. Recent sequential sampling models provide a computational modeling approach to explain context effects, such as Multi-attribute Decision Field Theory (Roe et al., 2001) and the Leaky Accumulator model (Usher & McClelland, 2004). These process models also predict an unbiased sequential sampling process, and are either based on lateral inhibition (Roe et al.) or on loss aversion (Usher & McClelland).

Another series of models predict context effects by means of a biased process. Emergent-value models explain the effects in terms of justification (Pettibone & Wedell, 2007; Simonson, 1989), an option gets extra (emergent) value by means of a qualitative argument. Recently our own work on loss aversion (Willemsen et al., 2008), suggests that decision makers show an information acquisition process that is predominantly alternative-focused, and that over time attention is directed towards the option that is preferred (i.e., sampling is biased towards the chosen alternative). Studying the phenomenon of loss aversion, we showed that a ‘Decision by Distortion’ account could best account for the process data (information acquisition patterns) we observed. We also observed significant presentation order effects on the choice data, which is predicted by a decision by distortion account because early preferences may affect direction of search and likewise final preference.

We tested these accounts using process data gathered online from a group of 374 ordinary US citizens, ranging from 18 to 65 years of age, and from all educational levels. Each participant made
several choices for different product classes (DVD-players, cell phones, printers and small TVs), including a compromise choice, and attraction effect choice and a two option choice (control). Additional individual measures were gathered (such as importance ratings, demographics, loss aversion for money).

An important contribution of the current paper is that we present new, more advanced, methodologies to analyze and test the process data we collected. Rather than looking at global search indexes, we look in detail to attention given to each attribute/alternative, and how this changes over time. Data was analyzed using multilevel regression to account for individual differences and repeated observations, and to include time dynamics. New representations (Icon Graphs) were used to provide a detailed qualitative view of the process measures in our data.

The choice results replicated the compromise and attraction effect. Effects of presentation order on choice proportions were observed (as predicted by a Decision by Distortion account) and some effects of individual characteristics, such as gender and age and relative importance of the attributes. Furthermore, process data was closely linked to choice, showing that process data indeed captures part of the cognitive process responsible for the construction of preference.

Secondly, the process predictions from the models were tested by contrasts within the multilevel models on attention, comparison and search dynamics. The data revealed a biased information acquisition process, showing strong shifts in attention towards the chosen option over time. This data supported an alternative-based account, and the decision by distortion account in particular. Little evidence was found for the unbiased acquisition processes such as predicted by current models like the Relative Advantage Model and current Sequential Sampling models.

The present paper demonstrates how new methodologies of analyzing process data can be used to more rigirously test processes assuming underlying models of decision making behavior, which might help us to distinguish between models in terms of their process validity. Furthermore, insights gained from these processes might allow us to build better specified models of decision making behavior, and those insights might also inform current computational models of context effects on what assumptions underlying these accounts might be most plausible from a psychological perspective.

“Understanding Dynamic Processes in Consumer Behavior”
Suresh Ramanathan, University of Chicago, USA

Consumer behavior researchers are very familiar with the use of between-subjects cross-sectional designs wherein participants provide data on their thoughts and feelings on a single occasion. Yet, psychological processes rarely tend to be static—they are subject to substantial internal and external influences every moment. Consider a person left alone in a room with a stranger for one hour. If one were to measure the mood of the person just before entering the room and again after a few minutes, the data may reveal both an internal variability (e.g., the person may have just had an argument with a friend leading to moods becoming more negative or may have just received an A on an exam, leading to moods becoming more positive) and external variability (due to the social influence of the stranger). One common way of looking at longitudinal measures is to use repeated measures ANOVA. However, this assumes that any intrinsic dynamics within a particular variable apply in the same way to all individuals in the sample in the interval between measurements, so that intra-individual variability may be mis-represented as measurement noise (Boker and Nesselroade 2002). Put simply, each individual or class of individuals may have a unique signature pattern of psychological dynamics. In this paper, we present two different ways of modeling intra-personal and interpersonal dynamics in two contexts—self-control and social interaction.

In the first illustration, we discuss the dynamics of ego-depletion and how depleted individuals respond to temptations on a moment-to-moment basis. Subjects were asked to suppress their emotions in response to a very sad video clip in the depletion condition (vs. no instruction in the control condition). Following this, they were presented with a tray filled with tempting desserts and instructed to move a joystick up and down (towards themselves if they felt like taking the dessert and away from themselves if they felt like pushing it away) continuously for 3 minutes. The following measures were computed from the resultant time series: a) distance from mid-point–positive if approach, negative if avoid, b) velocity computed as the first derivative of the time series and c) acceleration, computed as the second derivative of the time series. A nonlinear dynamic model was fitted with acceleration being modeled as a function of distance and velocity. The interpretation of the coefficient for distance is that it represents the frequency of oscillations in emotions, with higher absolute values implying greater cyclicality in feelings towards the temptation. The coefficient for velocity is indicative of regulation or excitation–negative values suggest that the individual is dampening the feeling towards the temptation, positive values indicate that the individual is experiencing increasing desire. Results indicated that depleted individuals had both a greater frequency of oscillations and an increasing desire compared to non-depleted individuals.

In the second illustration, we discuss the dynamics of social interaction and how people’s emotions change in response to the presence of others, both friends and strangers. Using a technique called cross-spectral analysis that decomposes the time series into different frequencies, we show that interacting friends who can see each other exhibit greater synchrony (as revealed by the covariation in the time series at specific frequencies) in their moment-to-moment reactions to a video clip compared to those who cannot see each other. The same is true for strangers who can see each other. However, we show that friends expect to experience this synchrony and discount it in their retrospective evaluations of the video clip while strangers misattribute the synchrony to the video clip and hence tend to use it as a heuristic to evaluate the clip.

“Good Practice in Experimental Moderation Designs”
Siegfried Dewitte, Catholic University Leuven, Belgium

The field’s favorite way of gaining insight in the processes underlying an association between variables, either causal or descriptive, is by means of statistical mediation tests. Spencer, Zanna, and Fong (2005) list six concerns associated with this technique and propose two alternatives. In this paper I focus on the moderation-of-process designs, in which the process, rather than measured, is experimentally manipulated, orthogonal to the independent variable manipulation. The typical design is a two-by-two design in which the independent variable, for which a main effect has been established, further called the basic effect, is crossed with a manipulation of the process. An ordinal interaction between the two manipulations in which the main effect is either (partially) suppressed or augmented is taken as evidence for the mediating role of the process in the basic effect.

However, an ordinal interaction does not invariably indicate moderation of the process. I distinguish three ways in which a researcher could mistake an interaction as evidence for a moderated process. The moderation manipulation may not (only) affect the target process, but (also) the independent variable itself. In that case the process underlying the basic effect is not suppressed but sabotaged from the start (‘the sabotage trap’). The moderation
manipulation may also influence the dependent variable directly. In that case, the process underlying the basic effect is not suppressed but overruled at the end (‘the sledgehammer trap’). The moderation manipulation may, finally, also initiate an alternative, artificial process. In that case the process underlying the basic effect is not suppressed but replaced by another process (‘the introspection trap’).

I will present a set of simple checks that researchers can implement to make sure that they exclusively affect the natural process. In addition to the actual dependent variable, the researcher needs (1) a measure that reliably reacts to the independent variable but not to the hypothesized process. The moderation manipulation should not interact with the independent variable on this variable (upstream criterion). Sabotaged processes will not pass this criterion. The researcher also needs (2) a measure that reacts to the process but is not inherently related to the actual dependent variable. The design is safe for the sledgehammer and the introspection trap if the independent and the moderation manipulation also interact on \( P \), provided that the partial correlation between \( P \) and the dependent variable (controlling for the experimental manipulations) is zero (= downstream criterion).

To the extent that the additional measures are sensitive to other measurements, they should be measured in separate samples. To the extent that they are intrusive, they should be measured at the end of the procedure. The rationale is generalizable to the case (1) of individual differences as moderating factors, (2) of multiple steps in the causal chain, and sheds new light on the concept ‘boundary condition’.

“Measuring Consumer Risk-Return Tradeoffs”
Daniel Goldstein, London Business School, UK

Consumer choice occurs over multiple products and services, each having multiple associated risks. The numerous outcomes and probabilities facing consumers may be unknown, or as we shall explore, be known but be too numerous and interdependent for the unaided mind to process. Product and service risks cause consumer anxiety as they worry about matters such as automotive breakdown, computer failure, drug toxicity, and fund underperformance. Marketing managers have similar worries from the sell side, along with additional concerns about predicting risk attitudes in order to design promotions, loyalty programs, and sales contests.

Despite the importance of risk to marketing, the measurement of risk preferences has lagged behind the swift progress made in the measurement of riskless, attribute-level preferences. Specifically, conjoint analysis has rocketed from its humble roots in mathematical psychology to become the marketing’s chief methodological export. The lack of a risk measurement method in the marketer’s toolbox might limit the impact that marketing research can have on insurance, financial services, and medicine, in which risk is an inextricable component. This paper presents a new market research technique for measuring consumer preferences over complex multiple-outcome risks.

How do people think about risk and return? Since the Enlightenment, theories of risk preference have been based on choices between simple gambles. In the last century, choices among gambles have been used to show violations of Utility Theory, and motivate subsequent alternatives, such as Subjective Expected Utility Theory, Rank Dependent Utility Theory, Cumulative Prospect Theory, Reference-Dependent Subjective Expected Utility Theory, among many others. In recent years, alternative models to the alternative models have been motivated by choices between gambles as well.

With the most notable exception being the estimation of consumer utility functions, why has consumer research had so little to say on risk preference? One possibility might be that simple prospects, while analytically tractable, are not realistic descriptions of the risks consumers regularly face. First, real product and service risks have multiple outcomes, not just two: An investment can return any percentage of its principal, and an insurance policy can be worth any percentage of its cost. Second, unlike simple prospects, consumer choice often occurs over far more than two alternatives. A consumer shopping for funds with Fidelity has over 4,500 investment products from which to choose. Each fund has a continuous distribution of outcomes, and each can be combined with other funds to create more portfolios than could be enumerated in a lifetime. As Lopes (1987) puts it, simple prospects “occur most frequently in the context of formal gambling and psychology experiments.” Measuring risk in the domain of multiple-alternative, multiple-outcome prospects seems warranted.

We focus on investing for retirement, one of the largest decisions many people ever make, and certainly one of the consequential consumer decisions for which researchers have been hearing the call. Most employees in the United States, upon starting a new job, are taken down the hall to the human resources department where they are shown a list of investment products, and asked to allocate 100 percentage points of their retirement contribution between them. Many employees spend less than an hour deciding how to allocate assets for retirement, which is surprisingly little time considering that as many as 90% or more will never change their initial choice and that the decision could impact their well-being for one third of their lives or more.

We present a new market research technique for studying preferences over multiple-outcome risks. We first describe the method, present its psychological and analytical motivations, and then report the results of empirical tests of its reliability and validity both within testing sessions and across the span of one year. Empirically, we use this method to estimate the coefficient of relative risk aversion and the loss aversion parameter for a sample of working adults who have been saving for retirement for 5 to 30 years. To foreshadow our results, the method passes tests of reliability and validity and captures individual differences based on age and income. It also identifies two sub-populations, one best fit by the classical economic theory of risk preference, and the other by a behavioral model incorporating loss aversion. We conclude by discussing how the new methodology can impact research on risk and consumer decision-making.

REFERENCES


