

Experimental Economics in Marketing

Ernan Haruvy
University of Texas at Dallas, USA
eharuvy@utdallas.edu

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Ernan Haruvy
University of Texas at Dallas, USA
eharuvy@utdallas.edu

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Abstract

Experimental economics employs laboratory and field experiments to characterize human behavior subject to economic constraints as well as to characterize economic behavior subject to human constraints. Despite a diversity of opinions, experimental economists adhere to a common set of research principles and methodologies that have developed over the years and distinguish this set of methodologies from experimental methodologies established in other disciplines. In recent years, the methodology of experimental economics has entered mainstream marketing research and has grown increasingly popular. This review presents an outline of the fundamental methodology of economic experiments as implemented in marketing research, gives examples of recent marketing experiments that adhere to the tenets of experimental economics, and organizes the marketing research employing experimental economics methodology into distinct topics, with additional detail on theory and applications.

1

Background

1.1 Introduction

Experimental economics is a methodological field consisting of a set of methodologies, practices, and principles. At the heart of experimental economics is the empirical investigation of economic behavior involving human subjects in a controlled environment. Experimental economics as a methodological approach is not the only experimental approach to studying human behavior. As such, it is sometimes confused with other approaches in marketing that may involve human subjects or the study of human behavior.

The field of experimental economics has evolved greatly in the last three decades, including the evolution of a symbiotic relationship with behavioral economics, the emergence of many new streams of research within experimental economics, the incorporation of experimental economics methodology in various fields and disciplines within and outside economics, and the emergence of field experiments as an important approach in experimental economics.

As experimental economics methods grow in prominence in marketing research, marketing researchers increasingly evolve experimental economics further, adding marketing flavors and theories, introducing

new problems, discussing new ways of looking at old problems, and bringing in complementary experimental practices from consumer research. As a researcher, I am in awe of the richness of problems, viewpoints, and flavors of experimental economics in marketing. However, it can be difficult to narrowly or precisely define experimental economics in marketing, given that different prominent researchers have very different viewpoints and backgrounds. In preparation for this work, I discussed some of the defining characteristics of the field with some of the leading researchers in the field, and received feedback that consisted of strongly held opinions that were sometimes contradictory regarding the scope of experimental economics in marketing, what can be considered legitimate experimental economics research in marketing, and what the key methodological conventions are. Examples of points of disagreements include the role of behavioral economics in experimental economics, whether each of the methodological tenets I list in this work is indeed an essential aspect of experimental economics in marketing, and even whether some of the works I list indeed fall in the realm of experimental economics.

However, despite the many viewpoints, it is safe to say that marketing researchers employing experimental economics methods agree on what experimental economics is not: It is not behavioral economics and it is not experimental consumer research — although it benefits greatly from both. Therefore, the first goal of this manuscript is to establish some broad distinctions.

Goal 1: Distinguish experimental economics from other fields in the broadest possible terms.

Section 1.2 addresses Goal 1. The target reader for Section 1.2 is the uninitiated reader who wants to get an idea of the broad distinction between fields, so the discussion in Section 1.2 is intentionally simplistic rather than a formal authoritative set of guidelines.

In experimental economics, as in every methodology, there are conventions, rules, and principles — which I refer to as tenets. If I had to list only two, they would be (1) incentivized decisions,

and (2) no deception. However, there are many other tenets, and Section 1.3 lists as many as possible, in order to address Goal 2.

Goal 2: Provide the basic methodological tenets of experimental economics.

Next, it is important for readers to understand differences between classes of experiments within experimental economics. Individual decision making tasks are very different from games in both focus and method. Likewise, market experiments have a different set of issues compared to other kinds of games. This third goal is addressed in Section 1.4.

Goal 3: Delineate classes of experiments within experimental economics.

If you look up the definition of experimental economics elsewhere and what distinguishes it from other experimental fields, you might find the answer to be that experimental economics is concerned with economic questions, whereas other fields are concerned with other questions. By that definition, marketers perhaps should not pursue experimental economics, focusing instead on experimental consumer research. However, marketers are concerned with economics questions and have important insights to add to the literature. Some of these insights are in pricing, auctions, salesforce incentives, channels, matching, and various behavioral issues. Some of the issues where marketing has had a particularly major contribution to experimental economics are highlighted in Section 2. This is not an exhaustive list of issues — but it is a representative one. This can be summarized as Goal 4.

Goal 4: Highlight important topics in experimental economics research in marketing.

I realize that I tried to list as many papers as I could in Section 2 and in some cases, it might read like a long list of abstracts. However, in various places in Section 2 I pause to reflect on the methodology. The various authors listed in Section 2 are careful experimentalists and their works emphasize the methodological

aspects of experimental economics. Where possible, I try to highlight some of these practices as examples for best practices. This is summarized as Goal 5.

Goal 5: Highlight best practices in marketing.

The manuscript throughout attempts to explain why marketers stand to benefit from understanding the tenets and approaches of experimental economics in their work, which I list as Goal 6.

Goal 6: Explain the benefits of experimental economics to marketers.

The main benefit to marketers from knowing the methodology of experimental economics is that it opens up a new world of empirical research possibilities. It allows analytical marketing theorists to empirically test or demonstrate their theories and propositions in the environment for which they were meant, without the need to seek real-world data sets that correspond exactly to the theory. It allows marketers to design and test mechanisms that may not yet exist, and therefore have no corresponding real-world data. It allows behavioral marketing researchers to ask and experimentally test questions that are not restricted to the consumer — by bringing experiments to the realm of strategic decision makers and competitive interaction. It allows for the mixing of behavioral insights with game theoretic analysis. It allows for econometric analysis of human behavior that can focus more on strategic behavior and less on the econometric modeling of the surrounding environment. It allows for abstraction from contextual cues and a narrower focus on incentives. In short, experimental economics as a body of methodology is not superior to existing experimental methodologies in marketing. It simply opens up an entire new world of questions that can be investigated in the lab or the field.

1.2 Related disciplines

Both the economics and marketing fields are concerned with the modeling and prediction of outcomes of human behavior. In economics,

more than in marketing, it is common to reduce complex behaviors to mathematical representations and then to solve mathematical — often game theoretical — models to arrive at predictions. Game theory made its entrance into mainstream economics following the publication of von Neumann and Morgenstern [1944]. Highly influential in the acceptance of game theory in economics is the work by (Nobel laureate, 2005) Schelling [1960]. That same influential work by Schelling is often quoted for: “One cannot, without empirical evidence, deduce what understandings can be perceived in a non-zero sum game of maneuver any more than one can prove, by purely formal deduction, that a particular joke is bound to be funny” [Schelling, 1960, p. 164]. Schelling’s quote, other than being clever, also points out the contradictory and conflicted nature of economics experimentation. On the one hand, the field asserts that a cue-rich environment should be reduced to abstract mathematical models, but then acknowledges that humans living in that abstract world might arrive at a solution different from that conceived by the theorist.

Traditional marketing experimentation has many of the same goals as economics experimentation. In fact, as we will shortly discuss, the settings and solution concepts investigated by economists have direct applications in marketing. But marketing also has a long tradition of experimentation that is deeply wary of over-abstracting the environment being modeled. In that sense, traditional marketing experimentation and traditional economics experimentation can be described as having similar goals but contradictory approaches.

In recent years, several trends have brought the two fields closer together. Within experimental economics, behavioral economics and field experimentation have come to occupy and influence an increasingly greater share of the field and brought with them greater emphasis on behavioral motives, increased richness of the environment, concerns for external validity, and acceptance for population differences. The marketing field, in turn, has largely embraced economic modeling, enabling the more traditional economics experimentation to find reception within marketing. In short, the two fields have increasingly come together to shed light on important marketing issues.

Experimental economics at its core involves the experimental — laboratory and field — testing of economic theories using real incentives to test economic models. While it encompasses a large number of topics, to be discussed in some detail, and works in the field are concerned with human behavior, the common denominator to all works in experimental economics is adherence to a common set of experimental conventions. Experimental economics conventions developed over a period of time — largely the second half of the twentieth century — and borrow from several disciplines (see historical account in Roth, 1995), but some are identified uniquely with the field of experimental economics as we know it today — particularly real incentives and the “no deception” convention (more on that shortly). Some of the tenets of the field were famously articulated by Smith [1976, 1982] and Plott [1982], which are often cited for these tenets and the Nobel Prize in economics was awarded to Smith in 2002 for advancing these tenets.

Though historical accounts by Roth (1995) and others trace the origins of experimental economics to Bernoulli [1738] and a historical account from Camerer and Lowenstein [2004] traces the origins of behavioral economics to Adam Smith [1759] loss aversion in particular, though altruism can be traced as well to the same source), the field of experimental economics as we know it today and the subset of behavioral economics that involves economics experimentation are relatively recent. The seeds may have been planted in the eighteenth century but rigorous economic experiments were not published until the 1950s (see review in Roth, 1995). Unified principles and conventions emerged roughly in the late 1970s and early 1980s. Experimental economics began to formalize problem definitions and games, constructs, tenets, and conventions roughly in the late 1970s and early 1980s. The Economic Science Association — the primary association for experimental economics, with Vernon Smith as its first president — was founded in 1986. The first three textbooks/handbooks in the field with “experimental economics” in the title were published in the early to mid 1990s [Davis and Holt, 1993, Friedman and Sunder, 1994, Kagel, 1995]. The first issue of *Experimental Economics*, the first field journal in experimental economics, was published in 1998. The field came to

the spotlight in 2002 with the Nobel Prize being awarded to one of its pioneers — Vernon Smith — and again in 2012 with the Nobel Prize awarded to then ESA president — Alvin Roth.

In order to highlight the use and usefulness of experimental economics in marketing, it is important to state some distinctions between three related fields — experimental economics, behavioral economics, and experimental consumer behavior research.

Behavioral economics is concerned with incorporating or blending psychological foundations into economic theory in order to improve the descriptive, explanatory, and predictive power of economic models. Behavioral economic principles may benefit from experimental methodology but can be validated or demonstrated in other ways as well, such as from secondary data. The most celebrated work in the behavioral economics field is the work by Kahneman and Tversky (1979). Kahneman and Tversky explored how judgment under uncertainty departs from mainstream economic rationality (Kahneman and Tversky, 1972, 1973, Tversky and Kahneman, 1971, 1973, 1974, 1982) and are best known for *Prospect Theory* which addresses judgment and decision making under risk and uncertainty, including weighting functions, heuristics, biases, and framing effects. While experiments are helpful in showing behavioral patterns, behavioral economics as a discipline is not purely or even primarily experimental. Behavioral economics work can be largely theoretical (e.g., Fudenberg, 1998; Goeree and Holt, 2004; Goeree, Anderson and Holt, 1998, Bolton and Ockenfels, 2000; Rabin, 1993). Behavioral economics can employ experimental procedures that are not incentivized (Kahneman and Tversky, 1979), or they can be empirical with nonexperimental data (Goldfarb and Yang, 2009; Goldfarb and Xiao, 2011). The focus is on the psychological and behavioral principles themselves and on incorporating them within economic models — not on a single unified experimental or empirical methodology to test them.

While behavioral economics is a distinct field from experimental economics, behavioral economics principles — particularly motives, utilities and biases — are today an integral part of experimental economics and the two fields have a strong symbiotic relationship.

Economics experiments are increasingly expected to address behavioral principles even if these are not the main focus of a particular investigation. And behavioral economists have increasingly embraced the methodology of experimental economics in empirical investigations. Many experimental economists identify themselves as behavioral economists, and so within the experimental economics community the distinction is not always critical as long as the experimental conventions of the field are respected.

In marketing, the distinction is more critical. The insights of behavioral economics and their importance have long been recognized in consumer research. Behavioral economics issues such as mental accounting [Thaler, 1985, Prelec and Loewenstein, 1998], inter-temporal preferences and time inconsistencies [Hoch and Loewenstein, 1991, Prelec and Loewenstein, 1997, Soman, 1998, Ariely and Loewenstein, 2000, Soman et al., 2005, Kivetz and Keinan, 2006, Lynch and Zauberman, 2006, Shu and Gneezy, 2010], among others, are possibly better known and accepted in marketing than they are in mainstream economics. In recent years, behavioral economics insights and models have entered quantitative marketing (the branch of marketing that adheres closely to economic modeling of marketing-relevant settings). There are several influential review papers that highlight the key behavioral economics concepts recently adopted into marketing [Cheema et al., 2005; Camerer et al., 2006a, 2006b; Goldfarb et al., 2012]. Different review papers provide variations on the set of topics in behavioral economics that are influential in marketing. Topics that are currently “trending” in marketing include hierarchical thinking, also known as level-k thinking and cognitive hierarchies [Goldfarb and Yang, 2009; Goldfarb and Xiao, 2011; Cui and Xiao, 2016], social preferences [Zwick and Weg, 2000, Lim and Ho, 2007, Ho and Zhang, 2008, Cui et al., 2007, Krishna and Wang, 2012, Orhun, 2015], and learning [Amaldoss and Jain, 2005; Erev and Haruvy [2010], Golan and Ert [2015]] to name a few.

Experimental economics, on the other hand, has not caught on with the same enthusiasm as behavioral economics in marketing. There are certainly published experimental economics works in marketing, to be reviewed here, and these works are influential, but the methodology

and philosophy of experimental economics can contradict mainstream *experimental consumer research*.

Experimental Consumer Research as a formal discipline is quite a bit older than experimental economics (notwithstanding the reference to Bernoulli and Adam Smith). A review article by Kollat et al. [1970] in the *Journal of Marketing Research* describes the field in 1970 as being in “its infancy, dating back less than 50 years” [Kollat et al., 1970, p. 327], which would make the field quite a bit older than the earliest documented incentivized economics experiments. The rich tradition of experimental consumer research fits well with behavioral economics research, but does not naturally sit with experimental economics research. In many ways, experimental economics and experimental consumer research too comes from contradictory philosophies. The former abstracts the decision problem to its bare bones, constructs decision problems from economic foundations, and ensures that human decisions are economically incentivized. The latter is concerned with consumer behavior constructs that are not fundamentally driven by economic principles, is wary of over-abstraction from relevant cues, enriches the problem description to the point that the consumer frame of mind is central, and because the emphasis is on putting the consumer in the correct frame of mind, incentivizing decisions is not only often unnecessary — it may even be harmful in that it moves the respondent away from the desired frame of mind.

Table 1.1 gives a brief, albeit slightly oversimplified representation of the differences between these three fields. Clearly exceptions can be found and opinions vary.

1.3 The methodology of experimental economics

A common set of conventions and tenets distinguish experimental economics from other experimental disciplines. In recent years, I see experimental economics explained to outsiders primarily along two tenets: *incentives* and *no deception*. Hertwig and Ortmann [2001] and Ariely and Norton (2007), for example, emphasize these two tenets

Table 1.1: Key differences between fields.

Difference	Behavioral economics	Experimental economics	Experimental consumer research
Experimental methodology follows the general conventions of experimental economics — particularly incentives and no deception	*	✓	
Models being tested are necessarily concerned with behavioral underpinnings	✓	*	✓
Models being tested are necessarily grounded in economics	✓	✓	
Rich contextual description is helpful in placing the decision maker in the relevant frame of mind			✓

*Depends on the desired outlet and target audience.

as the key features distinguishing experimental economics from psychology experiments. Katok [2011] likewise identifies incentives and no-deception as the primary elements for experimental economics in operations management. Given the attention to these two tenets, they are listed first in Table 1.2.

Davis and Holt [1993] is the commonly referenced citation for the no-deception principle (see quote in the table). No-deception is important in maintaining a usable subject pool for future experiments, so that induced value (to be discussed shortly) can be maintained. The issue is not mentioned in early works as a key principle or building block for the field. At some point in the 1990s, universities, grants, and journals began requiring written approval from Human Subjects and Institutional Review Board committees [Katok, 2011] and deception emerged as a key concern for economists for the reason listed above. At that point, deception became one of the big no-nos of the field.

Table 1.2: Distinguishing tenets of experimental economics.

Principle	Explanation	Quote
Laboratory and field experiments		
Incentives	Map actions to money or an object of value that would constitute a real incentive	<i>“The laboratory becomes a place where real people earn real money for making decisions about abstract claims that just as real as a share of General Motors” [Smith, 1976, p. 275].</i>
No deception	Never tell participants anything untrue or misleading about the experiment, its purpose, the setup, other participants, the mapping between actions and payment, etc. By extension, deceptive omissions are frowned upon.	<i>“Most economists are very concerned about developing and maintaining a reputation among the student population for honesty in order to ensure that subject actions are motivated by the induced monetary rewards rather than by psychological reactions to suspected manipulation” [Davis and Holt, 1993, pp. 23–24]</i>
Laboratory experiments		
Reduced realism	A complex and rich setting should be reduced to the simple and abstract.	<i>“The art of posing questions rests on the ability to make the study of simple special cases relevant to the complex [Plott, 1982, p. 1520]</i>
Controlled environment	Every aspect of the experiment should be carefully controlled and measurable.	<i>“...to create a small-scale microeconomic environment in the laboratory where adequate control can be maintained and accurate measurement of relevant variables guaranteed” [Wilde, 1981, p. 138].</i>
Parallelism	Behavioral regularities are assumed to hold in the external environment across situations with similar conditions.	<i>“Propositions . . . tested in laboratory microeconomies also apply to nonlaboratory microeconomies where similar ceteris paribus conditions hold” [Smith, 1982, p. 936]</i>

(Continued)

Table 1.2: (Continued)

Principle	Explanation	Quote
Replicability	Data sets, instructions, and code are commonly shared, and a nonreplicable result is a source of scorn. Undergraduate student subjects are strongly preferred for replicability.	<i>“Those familiar with experimental methods simply will not take the results of an experiment seriously unless it satisfies some basic standards of replicability” [Davis and Holt, 1993]</i>
Anonymity between participants	Anonymity between participants is the default, with careful attention to proper lab procedures for anonymity. There is a developed literature in the field that relaxes anonymity, but in a very controlled manner [e.g., Charness and Gneezy, 2008]	<i>“This procedure eliminates certain variables . . . connected with interpersonal perceptions, prejudices, incompatibilities, etc.” Siegel and Fouraker [1960, pp. 22–23]</i>
Repetition	Give subjects sufficient repetition to converge to an economically meaningful state (e.g., best response, equilibrium, coordination, steady state).	<i>“Does it [the participant’s behavior] survive after the subjects have had a long time to familiarize themselves with all the wrinkles of the unusual situation in which the experimenter has placed them? If not, then the experimenter has probably done no more than inadvertently trigger a response in the subjects . . . which bears only a superficial resemblance to the problem the subjects are really facing in the laboratory. [Binmore, 1994, pp. 184–185]</i>
Matching and contagion	The matching of subjects to one another in repeated interaction is of critical concern. If subjects interact with one another repeatedly, the observations cannot be treated as independent unless a no-contagion matching scheme is employed.	<i>“The number of independent observations may be smaller than it first seems” [Davis and Holt, 1993, p. 528]. The no-contagion scheme was first proposed by Cooper et al. (1991)</i>

Incentives are also discussed often in the literature as a key distinguishing characteristic and understood by some as somehow ensuring realism and external validity. Quite the opposite — incentives are important precisely because the traditional environment in laboratory economics experiments is largely devoid of realism and external validity in economics experimentation has a different meaning from experimental consumer research. Nearly all aspects of the environment except the set of actions, the strategic interaction and the incentives are stripped away. “Induced value” [Friedman and Sunder, 1994] means that the value the participants get from their choices in the experiment is entirely captured by the payoffs. Because the payoffs are nearly the only thing that remains after stripping away all else, it is important to actually pay these in cash or goods to have any validity at all.

While incentives and no-deception are indeed very salient features of the field, they were not originally the most fundamental principles of the field. One reason these two features have risen to the top of the list describing experimental economics is that they stand in contrast to other experimental methodologies where nonincentivized experiments are acceptable or where to enhance realism, subjects may be told something that is misleading. Another possible reason for the rise of these two principles to the top of the list is the emergence of field experiments as a mainstream methodology within experimental economics. Within field experiments, these two principles become more salient.

Friedman and Sunder [1994], largely based on the writings of Vernon Smith and Charles Plott, identified the following fundamental of experimental economics methodology: (1) reduced realism, (2) controlled environment, (3) induced-value, (4) and parallelism. These are listed in Table 1.2. They are as critical as no-deception or giving real payment, because they are essentially the four cornerstones of abstraction. They are all different aspects of the need for and implication of abstraction of a rich problem to its bare bones.

In experimental consumer research, in contrast, there is the general recognition of a trade-off between two important experimental features: internal validity and external validity [see Lynch, 1982]. *Internal validity* refers to control within the experiment and how confidently one can

conclude that the change in the dependent variable is produced solely by the independent variables being observed or manipulated. *External validity* refers to the extent to which a study's results can be generalized and applied to other people or situations. It is generally acknowledged in experimental consumer research that when measures are taken or procedures implemented aiming at increasing internal validity, these measures may also limit the generalizability — external validity— of the findings.

In the terminology of experimental consumer research, experimental economics tenets such as *reduced realism* and *parallelism* diminish external validity. Reduced realism says that the environment should be as abstract as possible and all richness of the environment that does not pertain directly to the model being tested should be removed. This severely limits external validity in the marketing sense of the word. Parallelism largely dismisses external validity as it is understood in consumer research and replaces it with the Latin *ceteris paribus* — all-else-equal. It basically puts the model before reality, which may seem strange to marketers but is within mainstream economic approach.

Replicability, which I list as a fundamental principle per Davis and Holt [1993] serves to limit external validity further. Replicability is the idea that an experimental result should be replicable by others. This not only requires very abstract instructions that can be transferred across populations, it also requires some reliance on undergraduate student populations as they are largely comparable, demographically and culturally, across institutions. It also requires careful documentation and voluntary sharing of procedures, instructions, experimental code, estimation code, and data. These are good scientific norms which marketing academics and journals have been heavily promoting in recent years, but are not part of traditional marketing experimentation and have not yet completely caught on. The marketing researcher entering the field of economics experimentation should be prepared to adhere to these norms.

Three additional principles ought to be mentioned. We start with anonymity. Standard economic experiments places a lot of weight, as part of the principle of “controlled environment” stated earlier, on

anonymity. This involves dividers between computer terminals, ensuring that interaction between subjects in the room is computer mediated [Katok, 2011], that subjects are identified by generic IDs and there is no identifying participant information in any interaction, and that participants do not find out who they were matched with. These are issues that are scientifically critical in economics publications, and will also arise in the human subjects approval process described earlier. There are certainly ways to reduce or increase social distance by revealing some aspects of an individual's identity in a way that does not compromise anonymity (and without deception). In fact, there is quite a bit of literature adding some controlled identity features, dating back to Fershtman and Gneezy [2001] who added identity characteristics for individuals playing trust games to show discrimination — greater mistrust — against the Sepharadi ethnicity in Israeli society. However, adding identifying characteristic such as gender, ethnicity, or race should be done, to the extent possible, while ensuring anonymity.

Repetition is another common element to economics experimentation that may be less recognized in marketing. The idea is that an individual seeking to reach optimal decision in the face of an uncertain or changing environment will need repetition to arrive at optimal choice, and likewise a group of individuals facing a game or a market will require repetition to arrive at equilibrium. This feature was noted as crucial by Binmore [1994] and highlighted by Hertwig and Ortmann [2001] as one of the key differences between economic experimentation and other experimental fields.

Lastly, the matching of subjects to one another is of critical concern due to two reasons: The first is strategic interaction, including strategic teaching. The second is inference and the ability to treat individuals as independent observations for the purpose of statistical analysis.

1.4 Distinctions within experimental economics

Experimental economists traditionally distinguish between three broad classes of experiments that differ along methodological lines and research focus: (1) Individual decision making experiments [Camerer,

1995], (2) games [Ochs, 1995], and (3) markets (Sunder, 1995). The three have different historical origins [detailed in Roth, 1995, and see Katok, 2011], different research focus, different methodological considerations, and different applications. Katok [2011] breaks the field into these three distinctions in a review article for experimental economics in operations management, and I believe this breakdown is the most appropriate for marketing as well. To these, I add field experiments, to be discussed separately.

Individual decision making involves no strategic interaction between individuals. Therefore, statistically, each individual is a standalone observation. Typically the purpose of such experiments is to study human cognition or map preferences. The emphasis in executing these experiments successfully in accordance with the principles of experimental economics is to make sure participants' decisions are incentivized, and that the environment is as abstract as possible.

Games. Games are representations of strategic interactions between decision makers. A game involves four essential elements [Rasmusen, 2006]: a pre-determined number of two or more decision makers, called players, facing a well-defined action space, well-defined information structure, and a complete specification of payoffs for each combination of actions. The payoff of each player depends on his or her own actions as well as the actions of other players and possibly on chance. When these four elements are well-defined, the game has one or more equilibrium solutions which can be used as a theoretical benchmark. Identifying the equilibrium is very important in these settings as well as any relevant solution concepts. Because equilibrium is a key concept and because choices might take a while to converge to equilibrium, it is common to have subjects repeatedly interact with each other to allow them to reach equilibrium. This interaction helps the convergence to equilibrium but it introduces a whole host of issues to worry about, including the possibility of subjects reciprocating or teaching others playing the game with them to behave in a way that benefits them. There are often end game effects and backward induction to worry about as well. Hence, experimental economists running game experiments worry about the matching of subjects to one another over time,

the contagion between subjects, the number of repetitions, and the finiteness of the horizon. They also worry about modeling and possibly eliciting beliefs, as beliefs play a central role in understanding strategic interaction in the game. Under marketing topics, the sections on pricing (2.1) and salesforce incentives (2.3) include a mix of individual decisions and games, whereas Section 2.4 on channels pertains largely to games, because the nature of channels is the interaction between channel members, although Katok and Pavlov [2013] investigate both games and individual decisions.

Markets generally involve buyers and sellers making, considering, and accepting bids. Auctions are often distinguished from markets as a separate subfield simply because the theoretical content and applications differ, but fundamentally auctions are a type of market. It is not uncommon to see a two-sided market referred to a double auction. Or an auction referred to as a one-sided market. A market will typically involve a few more than two players interacting, Smith et al. (1985) had groups of nine players for example. Markets are in essence games. They involve strategic interaction, well-defined actions, beliefs, best response to beliefs, equilibrium characterization, etc. Experimentally they share many of the same principles, including repeated interaction. The focus, however, is typically on the market as a unit of analysis including market statistics — market price, volume, efficiency, etc. Likewise, institutions, mechanisms, and formats [Roth, 2002] are of primary importance. Section 2.2 on auctions describes examples of market experiments.

Field experiments. In recent years, field experiments became increasingly popular and that would in my opinion qualify as a fourth classification. There are two separate streams in field experimentation. One advocates taking the abstract environment of the lab and bringing it to the field to populations more relevant to the problem — such as professional traders for a market experiment, professional athletes in problems involving mixed strategy equilibrium, or farmers in problems involving common pool resources. The second stream in field experimentation involves studying the problem directly in the field, with all its richness and cues. In marketing, I have found that works on field

experiments refer to the latter. In the marketing topics section, all subsections except Section 2.4 will describe some field experiments. Field experiments by their very nature involve some sacrifice in control and do not require induced values. Field experiments are prevalent in marketing and many of the works I describe in this manuscript are field experiments. In marketing, as in economics, field experimental studies vary in the degree of control exerted by the researcher.

References

- A. Abdulkadiroglu and T. Sönmez. House allocation with existing tenants. *Journal Economic of Theory*, 88(2):233–260, 1999.
- W. Amaldoss and C. He. Pricing prototypical products. *Marketing Science*, 32(5):733–752, 2013.
- W. Amaldoss and W. Shin. Competing for the low-end market. *Marketing Science*, 30(5):776–788, 2011.
- D. Ariely and G. Loewenstein. When does duration matter in judgment and decision making? *Journal of Experimental Psychology: General*, 129(4): 508–529, 2000.
- D. Ariely, U. Gneezy, and E. Haruvy. Social norms and the price of zero. Working paper, MIT, 2006.
- F. Bass, E. Haruvy, and A. Prasad. Variable pricing in oligopoly markets. *Journal of Business*, 79:2789–2810, 2006.
- D. Bernoulli. Exposition of a new theory on the measurement of risk. *Econometrica*, 22:23–36, 1738.
- M. Bhatt and C. F. Camerer. Self-referential thinking and equilibrium as states of mind in games: fMRI evidence. *Games and Economic Behavior*, 52:424–459, 2005.
- K. Binmore. *Playing fair*. MIT Press, 1994.
- A. Biswas, S. Dutta, and C. Pullig. Low price guarantees as signals of lowest price: The moderating role of perceived price dispersion. *Journal of Retailing*, 82(3):245–257, 2006.

- J. Brown, T. Hossain, and J. Morgan. Shrouded attributes and information suppression: Evidence from the field. *Quarterly Journal of Economics*, 125(2):859–876, 2010.
- C. Camerer and G. Lowenstein. Behavioral economics: Past, present, and future. In L. Camerer and M. Rabin, editors, *Advances in Behavioral Economics*, pages 3–51, 2004.
- D. Chakravarti, E. Greenleaf, A. Sinha, A. Cheema, J. C. Cox, D. Friedman, T. H. Ho, R. M. Isaac, A. A. Mitchell, A. Rapoport, M. H. Rothkopf, J. Srivastava, and R. Zwick. Auctions: Research opportunities in marketing. *Marketing Letters*, 13(3):281–296, 2002.
- G. Charness and U. Gneezy. What’s in a name? anonymity and social distance in dictator and ultimatum games. *Journal of Economic Behavior & Organization*, 68:29–35, 2008.
- A. Cheema, P. T. L. Popkowski Leszczyc, R. Bagchi, R. P. Bagozzi, J. C. Cox, U. M. Dholakia, E. A. Greenleaf, A. Pazgal, M. H. Rothkopf, M. Shen, S. Sunder, and R. Zeithammer. Economics, psychology, and social dynamics of consumer bidding in auctions. *Marketing Letters*, 16(3–4):401–413, 2005.
- H. Chen and N. Lim. Should managers use team-based contests? *Management Science*, 59:2823–2836, 2013.
- H. Chen, S. Ham, and N. Lim. Designing asymmetric multi-person tournaments: An experimental study. *Management Science*, 57:864–883, 2011.
- T. Cui and P. Mallucci. Fairness ideals in distribution channels. *Journal of Marketing Research*, 2016. Forthcoming.
- T. Cui and Z. Xiao. Is it really dumb to be dumber? competitive analysis of hierarchically strategic firms. Working paper, 2016.
- T. H. Cui, J. S. Raju, and Z. J. Zhang. Fairness and channel coordination. *Management Science*, 53(8):1303–1314, 2007.
- D. Davis and C. Holt. Experimental economics: Methods, problems, and promise. *Estudios Económicos*, 8(2):179–212, 1993.
- I. Erev and E. Haruvy. Two-stage lotteries and the value of unresolved uncertainty. *Marketing Letters*, 21(2):149–162, 2010.
- C. Fershtman and U. Gneezy. Discrimination in a segmented society: An experimental approach. *Quarterly Journal of Economics*, 116(1):351–377, 2001.
- B. S. Frey and F. Oberholzer-Gee. The cost of price incentives: An empirical analysis of motivation crowding-out. *American Economic Review*, 87(4):746–755, 1997.

- D. Friedman and S. Sunder. *Experimental Methods: A Primer for Economists*. Cambridge University Press, 1994.
- A. Gaba and A. Kalra. Risk behavior in response to quotas and contests. *Marketing Science*, 18(3):417–434, 1999.
- A. Gneezy, U. Gneezy, L. D. Nelson, and A. Brown. Shared social responsibility: A field experiment in pay-what-you-want pricing and charitable giving. *Science*, 329(5989):325–327, 2010.
- U. Gneezy and J. List. *The Why Axis: Hidden Motives and the Undiscovered Economics of Everyday Life*. PublicAffairs, October 8, 2013.
- U. Gneezy and A. Rustichini. Pay enough or don't pay at all. *Quarterly Journal of Economics*, 115(3):791–810, 2000a.
- U. Gneezy and A. Rustichini. A fine is a price. *Journal of Legal Studies*, 29(1):1–18, 2000b.
- U. Gneezy, S. Meier, and P. Rey-Biel. When and why incentives (don't) work to modify behavior. *Journal of Economic Perspectives*, 25(4):191–210, 2011.
- H. Golan and E. Ert. Pricing decisions from experience: The roles of information acquisition and response mode. *Cognition*, 136:9–13, 2015.
- A. Goldfarb, T. Ho, W. Amaldoss, A. Brown, Y. Chen, T. Galasso, T. Hosain, M. Hsu, N. Lim, M. Xiao, and B. Yang. Behavioral models of managerial decision-making. *Marketing Letters*, 23:405–421, 2012. DOI: 10.1007/s11002-012-9183-4.
- E. Haruvy and P. T. L. Popkowski Leszczyc. Internet auctions. *Foundations and Trends in Marketing*, 4(1):1–75, 2009.
- E. Haruvy and P. T. L. Popkowski Leszczyc. The impact of online auction duration. *Decision Analysis*, 7(1):99–106, 2010b.
- E. Haruvy and P. T. L. Popkowski Leszczyc. A study of bidding behavior in voluntary-pay charity auctions. Working paper, 2015a.
- E. Haruvy and P. T. L. Popkowski Leszczyc. The effect of involvement on fundraising: A charity field experiment. Working paper, 2015b.
- E. Haruvy and P. T. L. Popkowski Leszczyc. The losers bliss in auctions with price externality. *Games*, 6:191–213, 2015c.
- E. Haruvy and P. T. L. Popkowski Leszczyc. Measuring the impact of price guarantees on bidding in consumer online auctions. *Journal of Retailing*, 92(1):96–108, 2016.
- E. Haruvy and D. Stahl. Between-game rule learning in dissimilar symmetric normal-form games. *Games and Economic Behavior*, 74:208–221, 2012.

- E. Haruvy and U. Unver. Equilibrium selection and the role of information in repeated matching markets. *Economic Letters*, 94:284–289, 2007.
- E. Haruvy, D. Stahl, and P. Wilson. Evidence for optimistic and pessimistic behavior in normal-form games. *Economics Letters*, 63:255–259, 1999.
- E. Haruvy, D. Stahl, and P. Wilson. Modeling and testing for heterogeneity in observed strategic behavior. *Review of Economics & Statistics*, 83:146–157, 2001.
- E. Haruvy, A. Roth, and U. Unver. The dynamics and unique characteristics of the law clerk matching: An experimental investigation. *Journal of Economic Dynamics and Control*, 30:457–486, 2006.
- E. Haruvy, P. T. L. Popkowski Leszczyc, and Y. Ma. Does higher transparency lead to more search in online auctions. *Production and Operations Management*, 23(2):197–209, 2014.
- K. Haruvy and Pavlov. Bargaining process and channel efficiency. Working paper, 2015.
- R. Hertwig and A. Ortmann. Experimental practices in economics: A methodological challenge for psychologists? *Behavioral and Brain Sciences*, 24:383–451, 2001.
- J. Heyman and D. Ariely. Effort for payment: A tale of two markets. *Psychological Science*, 15(11):787–793, 2004.
- G. J. Hitsch, A. Hortaçsu, and D. Ariely. Matching and sorting in online dating. *American Economic Review*, 100(1):130–163, 2010a.
- G. J. Hitsch, A. Hortaçsu, and D. Ariely. What makes you click? mate preferences in online dating. *Quantitative Marketing and Economics*, 8(4):393–427, 2010b.
- T. Ho and J. Zhang. Designing pricing contracts for boundedly rational customers: Does the framing of the fixed fee matter? *Management Science*, 54(4):686–700, 2008.
- S. Hoch and G. Loewenstein. Time-inconsistent preferences and consumer self-control. *Journal of Consumer Research*, 17:492–507, 1991.
- T. Hossain and K. K. Li. Crowding out in the labor market: A pro-social setting is necessary. *Management Science*, 60(5):1148–1160, 2014.
- T. Hossain and J. A. List. The behavioralist visits the factory: Increasing productivity using simple framing manipulations. *Management Science*, 58(12):2151–2167, 2012.

- T. Hossain and J. Morgan. ... Plus shipping and handling: Revenue (non) equivalence in field experiments on ebay. *Advances in Economic Analysis and Policy*, 6(2):Article 3, 2006.
- J. Kagel. Auctions: A survey of experimental research. In J. Kagel and A. Roth, editors, *Handbook of Experimental Economics*, pages 501–585, Princeton NJ, Princeton University Press, 1995.
- J. Kagel and A. Roth. The dynamics of reorganization in matching markets: A laboratory experiment motivated by a natural experiments. *Quarterly Journal of Economics*, 115(1):201–235, 2000.
- A. Kalra and M. Shi. Designing optimal sales contests: A theoretical perspective. *Marketing Science*, 20(2):170–193, 2001.
- W. Kamakura and G. Russell. A probabilistic choice model for market segmentation and elasticity structure. *Journal of Marketing Research*, 26:379–390, 1989.
- E. Katok. Using laboratory experiments to build better operations management models, foundations and trends in technology. *Information and Operations Management*, 5(1):1–86, 2011.
- E. Katok and V. Pavlov. Fairness in supply chain contracts: A laboratory study. *Journal of Operations Management*, 31:129–137, 2013.
- E. Katok and D. Y. Wu. Contracting in supply chains: A laboratory investigation. *Management Science*, 55(12):1953–1968, 2009.
- J.-Y. Kim, M. Natter, and M. Spann. Pay what you want: A new participative pricing mechanism. *Journal of Marketing*, 73(1):44–58, 2009.
- R. Kivetz and A. Keinan. Repenting hyperopia: An analysis of self-control regrets. *Journal of Consumer Research*, 33:273–282, 2006.
- D. Kollat, J. Engel, and R. Blackwell. Current problems in consumer behavior research. *Journal of Marketing Research*, VII:327–332, 1970.
- A. Krishna and M. Utku Ünver. Improving the efficiency of course bidding at business schools: Field and laboratory studies. *Marketing Science*, 27:262–282, 2008.
- A. Krishna and Y. Wang. Enticing for me but unfair to her: Can targeted pricing evoke socially conscious behavior? *Journal of Consumer Psychology*, 22(3):433–442, 2012.
- S. D. Levitt and J. A. List. Field experiments in economics: The past, the present, and the future. *European Economic Review, Elsevier*, 53(1):1–18, 2009.

- N. Lim and H. Chen. When do group incentives for salespeople work? *Journal of Marketing Research*, 51:320–334, 2014.
- N. Lim and T. Ho. Designing price contracts for boundedly rational customers: Does the number of blocks matter? *Marketing Science*, 26:312–326, 2007.
- J. A. List. Why economists should conduct field experiments and 14 tips for pulling one off. *Journal of Economic Perspectives*, 25(3):3–16, 2011.
- C. H. Loch and Y. Wu. Social preferences and supply chain performance: An experimental study. *Management Science*, 54(11):1835–1849, 2008.
- N. H. Lurie and J. Srivastava. Price-matching guarantees and consumer evaluations of price information. *Journal of Consumer Psychology*, 15, 2005.
- J. Lynch. On the external validity of experiments in consumer research. *Journal of Consumer Research*, 9(3):225–239, 1982.
- J. Lynch and G. Zauberaman. When do you want it? Time, decisions, and public policy. *Journal of Public Policy & Marketing*, 25(Spring):67–78, 2006.
- V. Mak, R. Zwick, A. R. Rao, and J. A. Pattaratanakun. “Pay-what-you-want” as threshold public good provision. *Organizational Behavior and Human Decision Processes*, 127:30–43, 2015.
- K. McCabe and V. L. Smith. Neuroeconomics. In L. Nadel, editor, *Encyclopedia of Cognitive Sciences*, MIT Press, Cambridge, 2001.
- R. Nagel. Unraveling in guessing games: An experimental study. *The American Economic Review*, 85(5):1313–1326, 1995.
- Y. Orhun. Reciprocating to strategic kindness. Working paper, 2015.
- C. R. Plott. Industrial organization theory and experimental economics. *Journal of Economic Literature*, 20:1485–1527, 1982.
- L. Popkowski, T. L. Peter, C. Qiu, S. Li, and M. H. Rothkopf. Bidding behaviors in charity auctions. *Marketing Letters*, 26(1):17–28, 2015.
- D. Prelec and G. Loewenstein. Beyond time discounting. *Marketing Letters*, 8:97–108, 1997.
- D. Prelec and G. Loewenstein. The red and the black: Mental accounting of savings and debt. *Marketing Science*, 17:4–28, 1998.
- C. Qiu, T. L. Peter, P. Leszczyc, and Y. He. Factors affecting price setting in online auctions. *Journal of Revenue and Pricing Management*, 11(3):289–302, 2012.
- M. Rabin. Incorporating fairness into game theory and economics. *The American Economic Review*, 83(5):1281–1302, 1993.

- E. Rasmusen. *Games and Information: An Introduction to Game Theory*. 4th edition, Wiley-Blackwell, 2006.
- A. E. Roth. The economist as engineer: Game theory, experimental economics and computation as tools of design economics. *Econometrica*, 70(4):1341–1378, 2002.
- T. C. Schelling. *The Strategy of Conflict*. Harvard University Press, Cambridge MA, 1960.
- S. Shu and A. Gneezy. Procrastination of enjoyable experiences. *Journal of Marketing Research*, 47(5):933–944, 2010.
- S. Siegel and L. Fouraker. *Bargaining and group decision making: Experiments in bilateral monopoly*. McGraw-Hill, New York, 1960.
- A. Smith. *The Theory of Moral Sentiments*. New York: Prometheus, 1759.
- V. L. Smith. Experimental studies of discrimination versus competition in sealed-bid auction markets. *The Journal of Business*, 40(1):56–84, 1967.
- V. L. Smith. Experimental economics: Induced value theory. *American Economic Review*, 66(2):274–279, 1976.
- V. L. Smith. Microeconomic systems as an experimental science. *American Economic Review*, 72:923–955, 1982.
- D. G. Soman. The illusion of delayed incentives: Evaluating future effort–monetary transactions. *Journal of Marketing Research*, 35:427–437, 1998.
- D. G. Soman, A. S. Frederick, X. Li, J. Lynch, P. Moreau, A. Mitchell, D. Read, A. Sawyer, Y. Trope, K. Wertenbroch, and G. Zauberman. The psychology of intertemporal discounting: Why are distant events valued differently from proximal ones? *Marketing Letters*, 16(3):347–360, 2005.
- M. Spann, H. Ernst, B. Skiera, and J. H. Soll. Identification of lead users for consumer products via virtual stock markets. *Journal of Product Innovation Management*, 26:322–335, 2006.
- D. O. Stahl and E. Haruvy. Level- n bounded rationality and dominated strategies in normal-form games. *Journal of Economic Behavior and Organization*, 66(2):226–232, 2008a.
- D. O. Stahl and E. Haruvy. Level- n bounded rationality in two-person two-stage games. *Journal of Economic Behavior and Organization*, 65(1):41–61, 2008b.
- D. O. Stahl and E. Haruvy. Testing theories of behavior for extensive-form two-player two-stage games. *Experimental Economics*, 12(2):242–251, 2009.

- R. H. Thaler. Mental accounting and consumer choice. *Marketing Science*, 4: 1999–214, 1985.
- J. von Neumann and O. Morgenstern. *Theory of Games and Economic Behavior*. Princeton University Press, 1944.
- Y. Wang and E. Haruvy. Tiers in one-sided matching markets: Theory and experimental investigation. *Management science*, 59(6):1458–1477, 2013.
- Y. Wang and A. Krishna. Timeshare exchange mechanisms. *Management Science*, 52(8):1223–1237, 2006.
- L. Wilde. On the use of laboratory experiments in economics. In J. Pitt, editor, *Philosophy of Economics*, pages 137–148. Dordrecht, Holland: D. Reidel, 1981.
- Y. Yang, M. Shi, and A. Goldfarb. Estimating the value of brand alliances in professional team sports. *Marketing Science*, 28(6):1095–1111, 2009.
- C. Zamudio, Y. Wang, and E. Haruvy. Human brands and mutual choices: An empirical investigation of the marketing assistant professor job market. *Journal of the Academy of Marketing Science*, 41(6):722–736, 2013.
- B. Zhou, C. F. Mela, and W. Amaldoss. Do firms endowed with greater strategic capability earn higher profits? *Journal of Marketing Research*, LII:325–336, 2015.
- R. Zwick and E. Weg. An experimental study of buyer-seller negotiation: Self-interest versus other-regarding behavior. In J. H. Stephen and R. Meyer, editors, *Advances in Consumer Research*, volume 27, pages 190–195, Provo, UT: Association for Consumer Research, 2000.