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Using crowdsourced online experiments to study context-dependency of behavior

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ABSTRACT

We use *Mechanical Turk's* diverse participant pool to conduct online bargaining games in India and the US. First, we assess internal validity of crowdsourced experimentation through variation of stakes (\$0, \$1, \$4, and \$10) in the Ultimatum and Dictator Game. For cross-country equivalence we adjust the stakes following differences in purchasing power. Our marginal totals correspond closely to laboratory findings. Monetary incentives induce more selfish behavior but, in line with most laboratory findings, the particular size of a positive stake appears irrelevant. Second, by transporting a homogeneous decision situation into various living conditions crowdsourced experimentation permits identification of context effects on elicited behavior. We explore context-dependency using session-level variation in participants' geographical location, regional affluence, and local social capital. Across "virtual pools" behavior varies in the range of stake effects. We argue that quasi-experimental variation of the characteristics people bring to the experimental situation is the key potential of crowdsourced online designs.

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1. Introduction

The last five years have seen a rapid increase in crowdsourced recruiting for social science experiments over the Internet. Crowdsourcing platforms facilitate fast and inexpensive implementation of online experiments on large scales ([Mason and Suri, 2011](#)), tapping into real online labor markets ([Horton et al., 2011](#)) sustained by a substantially broader and more cross-national population ([Berinsky et al., 2012](#)) than in traditional experimental subject pools (see [Henrich et al., 2010](#) for a prominent critique). Recently, however, some have questioned the quality of inferences from crowdsourced samples ([Chandler et al., 2014](#); [Gupta et al., 2014](#); [Marder, 2015](#)), particularly raising concerns regarding experience and self-selection of participants compromising online experiments' internal and external validity.

Against this backdrop we conducted a cross-national online experiment using Amazon's *Mechanical Turk* for recruitment ($N = 991$). We utilize international participation in a homogeneous online environment to circumvent common pitfalls of traditional cross-regional experimentation including multiple laboratories, ambiguous translations, and experimenter effects ([Roth et al., 1991](#)). We focus on fairness behavior among participants from the US and India using the Ultimatum Game (UG) and the Dictator Game (DG) for data generation. Both countries are quite distant on various axes of cultural differentiation (cf., [Bonikowski, 2010](#); [Huntington, 1993](#); [Inglehart and Baker, 2000](#)).

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Our aim is twofold: First, we validate our set-up by experimental variation of monetary stakes (\$0, \$1, \$4, and \$10). We do not claim originality in this design for testing reproducibility of laboratory results. Others have posed similar research questions before (Amir et al., 2012; Raihani et al., 2013), and recent studies systematically compared results from crowdsourced online experiments and behavioral games in the laboratory (e.g. Hergueux and Jacquemet, 2015; Horton et al., 2011). We have extended prior research, however, enhancing functional equivalence in design (Harkness et al., 2003; Lynn, 2003) by adjusting stakes with respect to country-specific purchasing power.

Second, we will argue that crowdsourced online experiments provide a valuable complement to laboratory research transporting a homogeneous decision situation into various living conditions and social contexts. In fact, we believe that quasi-experimental variation of the characteristics people bring to the experimental situation is the key potential of crowdsourced online designs. Bringing context back into social experiments is particularly relevant for sociological research allowing inclusion of macro variables to explain individual behavior (Blalock, 1984; Coleman, 1990).

We exploit session-level variation in participants' geographical location to explore context-dependency of economic behavior. Our novel contribution thus follows from an analysis of what we call "virtual pools:" Crowdsourcing permits flexible grouping of participants along context variables (such as regional average income or social capital) to estimate effects of social strategies learned in participants' local environments. Virtual pools thus offer refined opportunities for comparison across social strata, regions, and cultures. To assess the importance of context our estimated stake effects provide a valuable benchmark.

Bargaining games concern the division of money between two players and model situations of conflict between self-interest and socially desirable behavior. UG and DG thus reveal expectations about valid social norms in a particular population (Bicchieri, 2006; Elster, 2007; Henrich et al., 2005).² We use bargaining games specifically because norms of fairness are strongly conditional on local context: Subjects' tendency to adhere depends on beliefs of others' compliance and others' normative expectations (Bicchieri, 2006; Bicchieri and Xiao, 2009).

The remainder proceeds as follows: First, we summarize strengths and weaknesses of global crowdsourcing platforms as tools for social experimentation (Section 2). We then outline our experimental design and hypotheses (Section 3). Section 4 introduces our approach of virtual pools. In Section 5 we evaluate the internal validity of crowdsourced online experiments, scrutinize potential influence of socio-demographics, and demonstrate exemplary analyses of virtual pools. Section 6 concludes with a discussion of challenges that lie ahead.

2. Crowdsourced experimentation

Crowdsourcing platforms aid implementation of large-scale online experiments (Berinsky et al., 2012; Buhrmeister et al., 2011; Mason and Suri, 2011). To this date Amazon's *Mechanical Turk* (MTurk) sustains the largest and most diverse participant pool. In 2014 MTurk's workforce exceeded 500,000 participants in 190 countries (Paolacci and Chandler, 2014), 60% from the US; India provides the largest portion of non-Americans, about one third of participants (Ross et al., 2010). Altogether, English serves as the commercial language.

MTurk has been launched in 2005 to provide clients (requesters) access to registered participants (workers) for hard-to-automatize "human intelligence tasks" (HITs). Requesters either upload tasks or redirect workers to outside websites. Each worker can choose from a continually updated list of HITs describing tasks, required qualifications, and payments. Following successful completion, requesters reward workers via MTurk's payment scheme (Amazon keeps an additional 10% of payments). MTurk allows configuration of HITs as surveys and experiments and so has proven increasingly useful for data generation in economics (e.g. Horton et al., 2011), political science (e.g. Berinsky et al., 2012), psychology (e.g. Crump et al., 2013), and sociology (e.g. Weinberg et al., 2014).³

MTurk is considered a real online labor market (Horton et al., 2011) in which workers seek profit-maximizing allocation of time and qualification. Unlike laboratory set-ups, Internet-based experimenting occurs in a relatively natural context limiting bias from unfamiliar testing conditions (Reips, 2002; Rhodes et al., 2003). Samples from MTurk are substantially more diverse in terms of participant characteristics than those from traditional experimental subject pools. American MTurk samples have repeatedly shown to be more representative of the US population than standard local convenience samples used in survey and laboratory research, but less representative than national survey samples and high-quality Internet panels (Berinsky et al., 2012; Buhrmeister et al., 2011). Compared to traditional laboratory research crowdsourced experimentation also reaps monetary benefits: Maintaining a physical laboratory becomes obsolete and show-up fees no longer need to cover participants' travel expenses.

Crowdsourced experimentation is not free from methodological challenges. Most importantly, researchers obtain no direct control over participants' surroundings. The upside is increased anonymity both among participants and towards the experimenter. Lack of control, however, permits larger variation in experimental conditions. For example, participants might be observed when taking the experiment or use the Internet to look up eligible answers and strategies. In principle, this is a

² Social norms are informal rules proscribing or prescribing certain behaviors. If perceived valid among a sufficiently large fraction of the population, and thus supported by mutual expectations, social norms generate regular patterns of behavior (Bicchieri, 2006; Bicchieri and Xiao, 2009).

³ In June 2015 *Web of Science* listed 326 social science publications using MTurk for data generation. For technical implementation of experiments see Buhrmeister et al. (2011), Mason and Suri (2011), and, particularly, the blog *Experimental Turk* (2015). The platform is accessible at www.mturk.com.

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