The Devil You (Don't) Know: Interpersonal Ambiguity and Inference Making in Competitive Contexts

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Past research has shown the robustness of egocentric anchoring or false consensus effects (e.g., Naylor, Lamberton, and Norton; Ross, Greene, and House) primarily in situations where consumers adopt a cooperative or neutral stance toward one another. However, competition among consumers is a ubiquitous part of Western culture. Across five experiments in competitive contexts (either a dictator game or an online auction), interpersonal ambiguity leads to an inference of dissimilarity, rather than similarity. As a result, consumers compete as aggressively against ambiguous others as they do against dissimilar others. This effect occurs regardless of brand quality, seller reputation, or number of other competitors in the auction. A final study demonstrates that aggressiveness may be directed toward the seller rather than other bidders when sellers are ambiguous or dissimilar. This work therefore offers an important boundary condition for the operation of egocentric tendencies, highlighting the pervasive effect of competitive contexts on consumer behavior.

To make use of information from individuals around us, it is often critical to make inferences about how similar they are to ourselves (Gershoff, Broniarczyk, and West 2001; Naylor, Lamberton, and Norton 2011). A review of social comparison literature yields robust generalizations about these inferences and their effects: to the extent that others are inferred to be dissimilar to the self, their influence is discounted or rejected. In contrast, if others are inferred to be similar to the self, their influence grows (Brown and Reingen 1987; Eagly, Wood, and Chaiken 1978; Simons, Berkowitz, and Moyer 1970). If others' identities are unknown (i.e., ambiguous; Naylor et al. 2011), it appears to be a robust default to infer that they are similar to us and behave accordingly, as seen in demonstrations of egocentric biases and the false consensus effect (e.g., Dunning and Cohen 1992; Marks and Miller 1987; Naylor, Lamberton, and West 2012; Ross, Greene, and House 1977).

Inferences of similarity may seem natural in situations where social influencers are likely to be in a cooperative or neutral stance toward target individuals. However, consumers in Western economies are often either in explicit or de facto competition (Deutsch 2008; Kuhlman and Marshello 1975; McClintock and Liebrand 1988). In the present research, we argue that competition dramatically alters the inferences we make about ambiguous others and, thus, how we behave toward them. We examine the aggressiveness of consumers' behavior in a dictator game and in online auctions, inherently competitive situations, as a means to explore this hypothesis. Building on past research in social influence and competition (e.g., Brown and Reingen 1987; Deutsch 2008; Eagly et al. 1978; Simons et al. 1970), we find that consumers compete more aggressively with dissimilar others than they do with similar others. Contrasting with past literature on inferences about ambiguous others, however, we find that in competitive contexts, a lack of information about other bidders leads to an inference of

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dissimilarity, pushing aggressive behavior toward competitors upward relative to similarity. When only a single competitor is present, we show that effects of interpersonal similarity, dissimilarity, or ambiguity on aggressiveness are robust to manipulating other characteristics of auctions that are known to alter price levels, including brand quality and seller reputation. Further, results replicate when multiple other bidders are present, consistent with the theoretical account we propose but not with assimilation or contrast effect explanations. We also show that when external cues indicate the identity of an ambiguous competitor, thus obviating the need for inference making, consumers compete with ambiguous others in a manner consistent with the external cue. A final study shows that our theory can also be applied to considerations of seller identification, though intriguing results suggest competitive focus may shift in some cases.

The present work thus offers the major theoretical insight that a competitive context moderates inferential patterns that underlie egocentric biases and false consensus effects, despite the fact that these effects have been shown to be nearly "ineradicable" in prior research (Krueger and Clement 1994). This insight also suggests that findings inconsistent with egocentric biases may be more generalizable than previously expected. For example, Miller, Maner, and Becker (2010) demonstrated that priming direct ego threat or overt aggression was necessary for individuals to categorize relatively similar others as different from themselves. Our findings suggest that similar effects may be seen in any competitive context. Finally, we provide theoretical contributions to the auction literature, which often takes an analytical or empirical modeling perspective (e.g., Chan, Kadiyali, and Park 2007; Zeithammer 2006). Consistent with an increasing recognition of auctions as complex social phenomena (e.g., Cheema et al. 2005), we integrate both interpersonal and structural characteristics of auctions in our research.

THEORETICAL BACKGROUND AND HYPOTHESES

Cooperation, Competition, and Similarity

Competition can be said to occur whenever negative interdependence exists among individuals' goals, such that "the amount or probability of a person's goal attainment is negatively correlated with the amount or probability of the other's goal attainment" (Deutsch 2008, 24). Thus, competition among consumers may exist in auctions, where another consumer's receipt of a good precludes one's own, in workplace situations, where a promotion given to a colleague prevents one from advancement, or in a society, where individuals approach resource ownership with an inherently competitive mind-set.

How will knowing the identity of a competing individual or facing ambiguity about their identity influence how we behave in such contexts? Past research suggests that the similarity or dissimilarity of other individuals will cue our own level of aggressiveness. Deutsch (2008) notes that threats seem greater when those we compete with are dissimilar to ourselves. Thus, when competing with dissimilar others, consumers are likely to both exert efforts to thwart others' goal pursuit and to take action to further their own. As such, we propose that dissimilarity will breed competition. In an auction, this would mean that dissimilar others vying for the same product will cue us to bid aggressively, pushing price levels up.

By contrast, interaction with similar others tends to prompt cooperation, self-sacrificing behavior, and compliance (Brock 1965; Brown and Reingen 1987; Eagly et al. 1978; Feick and Higie 1992; Miller 1984; Piliavin and Chang 1990; Stürmer, Snyder, and Omoto 2005). In addition, individuals anticipate less threat from those whom they perceive to be connected to themselves in some way (Gardner, Gabriel, and Hochschild 2002; Kreps et al. 1982). Note that this does not mean that in a competitive context that similarity will yield cooperation, per se—after all, individuals still desire to obtain the pursued good or outcome and have voluntarily entered an inherently competitive interaction. However, we propose that consumers are less likely to behave as aggressively in pursuit of the desired outcome when contending with similar as opposed to dissimilar others. In an auction context, this would mean that bids do not escalate to the same degree when bidding against similar (vs. dissimilar) competitors.

Relative to these two situations, how will consumers behave if no information about the identity of a competitor is available? We propose that interpersonal ambiguity presents consumers with a type of missing information (Dick, Chakravarti, and Biehal 1990). Past research has argued that the more relevant a piece of missing information is to the consumer, the more likely it is to be spontaneously inferred (Dick et al. 1990; Gershoff et al. 2001; Naylor et al. 2011). Since competitor identity serves as a cue for the level of aggressiveness needed to beat one's rivals, we propose that consumers will make inferences that "fill in the blanks" about the identity of ambiguous competitors. Specifically, we predict that when in a competitive mind-set, consumers will infer that ambiguous others are *dissimilar* to the self. This prediction is in contrast to the Naylor et al. (2011) finding that consumers automatically infer that an ambiguous online reviewer is similar to the self. Note, however, that online review forums are an inherently cooperative setting, in which consumers voluntarily inform and are informed about products and services (Sridhar and Srinivasan 2012).

We base the prediction that consumers will infer ambiguous others to be dissimilar to the self in research that suggests that competitive contexts cue individuals to adopt cognitive patterns that distance their self-view from others (Stapel and Koomen 2005). Thus, in the absence of other mind-set cues or a desire to behave collaboratively, we propose that competitive contexts cue the use of a differentiating mind-set—a focus on dissimilarities rather than similarities between the self and others. Recent work in social psychology supports this argument, both at a group and individual level. First, Maner et al. (2012) argue from an evolutionary perspective that individuals categorize one an-

other as in-group or out-group members based on the likelihood of others promoting or impeding one's own goals. Given that competitive contexts involve negative interdependence among goals, such situations are likely to lead an individual to feel that others present an impediment to their goal achievement, resulting in competitors being categorized as out-group members. Relatedly, individuals have been shown to project their own personality traits to a lesser degree toward competitive as opposed to cooperative outgroups (Riketta and Sacramento 2008). Further, under threat, Miller et al. (2010) find that individuals have a tendency to categorize unfamiliar others as out-group rather than in-group members. To the extent that a competitive consumer context constitutes a salient threat, this work would suggest that ambiguous others would be categorized as out-group members rather than being interpreted egocentrically.

Considering this phenomenon at the individual level, Toma, Yzerbyt, and Corneille (2010) compare self-ratings to those of an unknown target when either cooperation or competition was anticipated. They found that when cooperation was anticipated, the tendency to project one's own traits onto others was reduced. These authors also argue that dissimilarity inferences serve an adaptive purpose in competitive contexts, as they allow consumers to take an adversarial stance toward each other, since concerns about maintaining harmony or in-group protection are not as salient as they would be when dealing with similar others (Zizzo and Tan 2007). Thus, dissimilarity inferences facilitate aggressiveness, without concerns that one's own win implies pain for competitors. Though this work informs our predictions, note that these authors acknowledge that they could only infer that the self was used as the basis for participants' ratings of unknown others; it is possible that the relationship to self-ratings was based in the use of alternate heuristics or other mental processes. Thus, the inference of self-similarity still warrants direct examination. Further, though Toma et al. (2010) argue that differentiating inferences may serve an adaptive purpose, prior work does not show that inferences of similarity to the self change aggressiveness and therefore might affect individuals' likelihood of "winning" or, from a consumer perspective, inflate their spending. Thus, building on this work we predict that:

H1: Consumers will compete more aggressively against ambiguous and identified dissimilar others than against identified similar others.

H2: Effects of competitor identification or ambiguity on aggressiveness are mediated by inferences of similarity between the consumer and his/her competitors.

Moderating Aggressiveness against Competitors

We have argued that the identity of ambiguous others presents a type of missing information and that inferences about this missing information are driven by the differentiating mind-set created by competitive contexts. However, if external cues indicate the identity of an ambiguous other, the need for inference making is obviated. Thus, we propose that consumers make inferences that distance an ambiguous other from themselves only (1) when in a competitive mind-set and (2) when contextual cues are not present that would indicate an ambiguous other's identity. If this theory is correct, then these propositions offer two opportunities to moderate the prediction made in hypothesis 1.

First, we propose that external influences may heighten or reduce the accessibility of competition-related cognitions. For example, the presence of business-related objects in a room can prime a competitive rather than cooperative mind-set: in studies conducted by Kay et al. (2004), participants primed with business (and hence with competition) tended to act in a more self-serving manner than those not exposed to the prime, even when a task was framed as cooperative. Similarly, we predict that if unrelated stimuli activate a cooperative mind-set prior to entering an inherently competitive environment, the tendency to infer dissimilarity when faced with ambiguity will be attenuated. As a result, aggressive tendencies toward ambiguous others will also decrease under a cooperative as opposed to competitive mind-set.

Second, providing contextual information about the identity of competitors can reduce consumers' tendency to make inferences about ambiguous others that are consistent with a competitive mind-set. When external information provides a cue as to the identity of ambiguous others, we anticipate that consumers will fill in the missing information about an ambiguous competitor's identity in a manner consistent with the available external cue. They will then adjust their aggressiveness in ways consistent with that cue. Thus, if external cues suggest that ambiguous others are similar, aggressiveness and the final sales price in auctions will be lower than if cues suggest that ambiguous bidders are dissimilar. Our theoretical account therefore suggests that:

H3: The tendency to compete as aggressively against ambiguous others as against identified dissimilar others will be attenuated when: (*a*) A cooperative as opposed to competitive mind-set is activated; (*b*) Contextual cues indicate that competitors are likely to be similar to the self (vs. when contextual cues provide no information about competitor similarity).

OVERVIEW OF RESEARCH

We test our hypotheses in a pilot study and four experiments. The pilot study supports hypothesis 1 in a dictator game: consumers become more aggressive when they are competing against a dissimilar or ambiguous other as opposed to a similar other. Study 1 then replicates effects observed in the pilot study in the context of a simulated online auction. However, it also shows that effects are attenuated by a cooperative prime, as predicted in hypothesis 3a. Studies 2a and 2b then highlight the robustness of the effect

TABLE 1

ORTHOGONAL CONTRAST CODES USED TO COMPARE THE AMBIGUOUS COMPETING BIDDER CONDITION DIRECTLY TO THE DISSIMILAR COMPETING BIDDER CONDITION

	Ambiguous competing bidder condition	Similar competing bidder condition	Dissimilar competing bidder condition
Contrast code 1:			
Ambiguous and dissimilar vs. similar competing bidder	1	−2	1
Contrast code 2:			
Dissimilar vs. ambiguous competing bidder	−1	0	1

NOTE.—The contrast codes in tables 1, 2, and 3 partition the MANOVA sums of squares into interpretable subsets (Rosenthal, Rosnow, and Rubin 2000). Note that because the codes are orthogonal, there is no need for special alpha levels.

proposed in hypothesis 1 when other auction factors are manipulated. In study 2a we show that relationships between similarity, dissimilarity, ambiguity, and aggressiveness persist even in the face of differences in brand quality and seller reputation. In study 2b, we show that the effect we propose is similarly robust when multiple other bidders, rather than a single competitor, are shown. Studies 3 and 4 then identify boundary conditions for our findings. Study 3 shows that aggressiveness toward ambiguous competitors changes when external cues obviate the need for inference making, consistent with hypothesis 3b, and tests the mediation proposed in hypothesis 2. Finally, study 4 suggests that ambiguity regarding the seller (vs. competing bidders) changes consumers' competitive focus, such that the identity of the seller becomes more important than that of competing bidders in determining aggressiveness.

PILOT STUDY: COMPETITION IN A DICTATOR GAME

In a typical dictator game, one player, "the proposer," determines how a cash prize will be split between themselves and a second, passive player, "the responder." The proposer can give as much or as little of the money to the responder as he or she chooses, but the more the proposer gives, the less he or she gets to keep (for an example of the dictator game's use in behavioral economics, see Camerer and Thaler 1995; see Ho, Lim, and Camerer 2006 for an example from the marketing literature). Although the game is inherently competitive, past research has shown that proposers typically allocate nonzero amounts to responders (Engel 2011). In our pilot study, we test whether proposers' allocations (and hence their aggressiveness in keeping money for themselves vs. sharing it with the responder) are determined by the identity of the responder. All participants ($n = 132$) in the study played the role of proposer and saw the profile of a responder who shared their demographic characteristics (similar responder condition), who did not share their demographic characteristics (dissimilar responder condition), or a responder about whom no information was provided (ambiguous responder condition; see table A1 for details). All participants were told that they were playing the game online and would have to decide how to allocate $100.00 between themselves and the responder to whom they were randomly assigned. The amount participants allocated to themselves was the dependent variable, capturing their aggressiveness in the game ($M = \$73.10$, range = \$40.00–\$100.00). Since the study was hypothetical, participants did not actually receive the money and were compensated with extra credit.

Given that identity of responder was a three-level variable, we used the orthogonal contrast codes shown in table 1 to compare (1) the ambiguous and dissimilar responder conditions to the similar responder condition and (2) the ambiguous responder condition to the dissimilar responder condition. When participants' self-allocations were regressed on these two contrast codes, we found that those in the ambiguous and dissimilar responder conditions allocated significantly more money to themselves ($M_{\text{ambigous}} = \$75.02$; $M_{\text{dissimilar}} = \$76.46$) than did those in the similar responder condition ($M = \$68.48$; $F(1, 129) = 3.69$, $p = .06$), whereas those in the ambiguous and dissimilar conditions allocated equal amounts of money to themselves ($F(1, 129) = 0.10$, $p = .75$).

Thus, the pilot study demonstrates that individuals are more aggressive in allocating funds to themselves when playing the dictator game with dissimilar as opposed to similar responders. Results also demonstrate that when the identity of the responder is ambiguous, consumers play the game the same way they would against a dissimilar responder. These results are consistent with hypothesis 1: in this inherently competitive zero-sum game, we do not see evidence of egocentric anchoring, where ambiguous others would be treated like similar others. Instead, individuals compete as aggressively against ambiguous others as they do against dissimilar others and less aggressively than they compete against similar others.

STUDY 1: COMPETITION IN AN ONLINE AUCTION

Study 1 seeks replication of these basic findings in a simulated live online auction. An online auction provides both an internally and ecologically valid context for studying inferences about ambiguous others in competitive contexts. First, online auctions preserve the negative interdependence necessary for a competitive experience without introducing possible "mixed motive" elements or allowing alternate

methods of goal attainment in the short-term. Second, varying consumer information in such contexts is consistent with real-world practice. For example, www.eBay.com conceals the identity of bidders but allows bidders to see the feedback and 30-day bid history for a fellow bidder. The sites www.webidz.com and www.webstore.com allow bidders to control information display by choosing to hide their bidder ID. If they do not do so, other bidders can click on their ID to see their profile and recent history on the site. The website www.onlineauction.com allows bidders to see other bidders' ID and feedback history. Other sites, like www.ePeir.com, allow bidders to contact other bidders by e-mail to request identifying information and to post profile pictures of themselves. Further, social media allows individuals to connect their online auction profiles with other online activity, raising the likelihood that competitor identity will be observed. For example, eBay has recently added a "like" button to sellers' pages, which allows bidders' Facebook profiles to be visible to other consumers (Steiner 2011). Thus, in this context, maintaining competitor ambiguity or allowing identification are possible and may be based either on consumer or retailer preference.

Participants and Procedure

A total of 193 undergraduate students at the University of South Carolina participated in this study for course extra credit. The study employed a 2 (prime: cooperation vs. competition) × 3 (competitor type: similar vs. dissimilar vs. ambiguous) between-subjects design. All participants were told that the session consisted of two separate studies; in actuality, these two studies were the two phases of a single experiment. In the first phase, participants were primed with either competition or cooperation by completing a word search involving words describing competition (e.g., battle, challenge, compete, contend, etc.) or words describing cooperation (e.g., collaborate, cooperate, partner, assist, etc.). This manipulation allows us to test hypothesis 3a. After completing this task, participants immediately began the next study, in which they were asked to participate in an Internet auction that was purportedly being conducted simultaneously with participants at other universities. This portion of the study allows us to seek replication of results predicted in hypothesis 1 and seen in the pilot study. All participants were given the following description of the auction process, which is consistent with a traditional English auction (McAfee and McMillan 1987):

> This auction will proceed like the auctions that are popular on many Internet websites like eBay or Amazon.com. Today you will be bidding on a single item. The winner of the item will be determined by the bidder with the highest bid amount. You will bid first and can bid any amount that you choose. The experimenter will be notified of the winner and the winning bidder will have 24 hours to pay for the item. The winning bidder will receive the item in the mail in approximately one week. You will be linked to a network of many consumers bidding on the item, but for sake of this auction you will only see one selected profile that is representative of the other bidders.

All participants were then shown a photo of the item they would be bidding on, a bottle of Five Hour Energy Drink, and a profile of a competing "representative" bidder. The profiles for the similar, dissimilar, and ambiguous competing bidder were the same as those used in the pilot study. Participants then bid on the energy drink by entering any dollar amount they chose. A total of 25 participants were dropped from further analysis because they chose not to bid on the item at all (i.e., they entered no bid or bid zero), thus indicating that they had zero interest in purchasing the product. As these individuals do not have a goal of obtaining the product, they do not face the negative goal interdependence that defines competitive experiences (Deutsch 2008). As such, it would be inappropriate to interpret their behaviors as relevant to competitive contexts. Following this thinking, nonbidders are excluded from all subsequent studies; we note that the pattern of effects remains he same when nonbidders are removed or retained and that nonbidders were distributed approximately equally across conditions. After these nonbidders were removed, 168 participants were left in the sample, all of whom bid at least 10 cents (the range for opening bid was \$0.10–\$1.25). Each time the participant bid, the computer responded by reporting that a competing bidder bid 25 cents more than their opening bid (such that if the participant made an opening bid of 25 cents, the competing bidder made a subsequent bid of 50 cents; specifically, participants were told, "You have been outbid. The price of this item is now \$0.50"). The program was designed so that participants would win the item after 10 bids. However, none of the participants bid 10 times ($M_{\text{number of bids}} = 1.93$) and thus none of them won the energy drink. In order to measure the aggressiveness with which participants were bidding, we captured the final selling price for the item ($M = \$0.96$).

Results

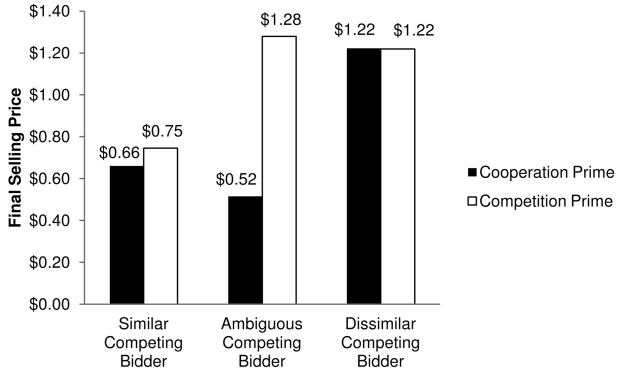
We again used the orthogonal contrast codes shown in table 1 to test our hypotheses. Specifically, we regressed these two contrast codes, the priming factor (cooperation vs. competition), and the interaction of the priming factor with both contrast codes on final selling price. We first note that the item sold for a higher price in the competition ($M = \$1.11$) than in the cooperation ($M = \$0.80$) prime condition ($F(1, 162) = 12.07$, $p < .001$). Consistent with hypothesis 1, we also observe higher sales prices in auctions against a dissimilar ($M = \$1.22$) and ambiguous ($M = \$0.92$) competing bidder than against a similar competing bidder ($M = \$0.70$; $F(1, 162) = 16.19$, $p < .0001$). There was also a main effect of the dissimilar versus ambiguous bidder contrast code for final selling price ($F(1, 162) = 11.20$, $p < .01$). Importantly, however, this main effect was qualified by an interaction between the priming factor and the second contrast code ($F(1, 162) = 15.71$, $p < .0001$), indicating that the aggressiveness with which participants bid

against an ambiguous versus dissimilar competitor is determined by prime condition, as predicted in hypothesis 3a.

Follow-up analysis in the competitive condition revealed that final selling prices were higher against an ambiguous ($M = \$1.28$) or dissimilar competitor ($M = \$1.22$) than against a similar competitor ($M = \$0.75$; $F(1, 84) = 12.14$, $p < .001$) and equal against an ambiguous and dissimilar competitor ($F(1, 84) = 0.15$, $p = .70$). In the cooperative prime condition, however, we observe the opposite effect (using the alternate contrast codes shown in table 2 to conduct the analysis): final selling prices were lower against an ambiguous ($M = \$0.52$) or similar competitor ($M = \$0.66$) than against a dissimilar competitor ($M = \$1.22$; $F(1, 78) = 40.39$, $p < .0001$) and equal against an ambiguous and similar competitor ($F(1, 78) = 1.57$, $p = .21$; see fig. 1).

FIGURE 1

STUDY 1: FINAL SELLING PRICE BY PRIME CONDITION AND COMPETITOR TYPE



Discussion

Study 1 conceptually replicates the pilot study's findings in a live auction context. Further, results reveal that ambiguous others generate different levels of aggressiveness when consumers are in a cooperative versus competitive mind-set. Participants compete less aggressively against an ambiguous other than they do a dissimilar other when in a cooperative mind-set, responding to ambiguity like similarity. This finding is consistent with prior research in egocentric biases. However, a competitive mind-set prompts participants to compete as aggressively against an ambiguous other as they do against a dissimilar other (and significantly less aggressively than they do against a similar other). This result is consistent with our theoretical framework and demonstrates an important means of moderating the robust egocentrically driven biases shown in prior research.

STUDIES 2A AND 2B: ROBUSTNESS REPLICATIONS

We have argued that the differences in prices paid in study 1 are due to changes in aggressiveness against other bidders based on their identity. However, participants in study 1 were only given information directly relevant to our hypotheses. In most auctions, consumers have information about other factors that have been shown to alter selling prices. If these factors overwhelm effects of bidder ambiguity or (dis)similarity, our findings may lack practical importance. Further, in study 1 we displayed only one other bidder. It is possible that multiple other bidders may be shown when bidding in real auctions. Studies 2a and 2b therefore test the robustness of our effects by manipulating additional information beyond the identity of a single bidder: seller reputation and brand quality in study 2a and the identity of multiple bidders in study 2b.

Study 2a: Participants and Procedure

In study 2a, we enrich the informational content available to participants in ecologically valid ways. In this richer, more realistic context, multiple pieces of information that could plausibly drive price levels (i.e., brand quality and seller reputation) compete for the bidder's attention. We expect to find that auction prices are still influenced by the identity of other bidders even in this more information-rich environment. A total of 238 undergraduate students at the University of South Carolina participated in this study for course extra credit. Participants were randomly assigned in a 2 (brand quality: low vs. high) × 2 (seller reputation: poor vs. good) × 3 (competitor type: similar vs. dissimilar vs. ambiguous) design. The procedure was identical to that used in study 1 except that participants were also told: "This bidding website asks buyers to rate sellers with a score of one to five stars, with five being the highest rating and one the lowest . . . . You will see the rating for the person selling the item you are bidding on today."

Participants then entered a simulated live auction (following the same format used in study 1) where they saw either a two star (poor reputation condition) or four and a half star (good reputation condition) seller. They bid on either a bottle of Five Hour Energy Drink in the high-quality brand condition or a bottle of "Number 1" Energy Drink in the low-quality brand condition. In a separate within-subjects pretest ($n = 96$), Five Hour Energy Drink was rated as being of significantly higher quality (on a 7-point scale) than Number 1 Energy Drink ($M_{\text{Five Hour Energy Drink}} = 4.84$, $M_{\text{Number 1}} = 2.60$; $F(1, 95) = 463.78$, $p < .0001$).

A total of 17 participants were dropped from further analysis because they chose not to bid on the item at all (i.e., they entered no bid or bid zero), leaving 221 participants in the sample, all of whom bid at least 1 cent (the range for opening bid was \$0.01–\$2.00). As in study 1, the program was designed so that participants would win the item after 10 bids. However, none of the participants bid 10 times ($M_{\text{number of bids}} = 1.60$), and thus none of them won the energy drink. We once again use the final selling price for the item ($M = \$0.82$) as an indicator of bidding aggressiveness.

TABLE 2

ORTHOGONAL CONTRAST CODES USED TO COMPARE THE AMBIGUOUS COMPETING BIDDER CONDITION DIRECTLY TO THE SIMILAR COMPETING BIDDER CONDITION

	Ambiguous competing bidder condition	Similar competing bidder condition	Dissimilar competing bidder condition
Contrast code 1:			
Ambiguous and similar vs. dissimilar competing bidder	1	1	−2
Contrast code 2:			
Similar vs. ambiguous competing bidder	−1	1	0

Study 2a: Results and Discussion

Results. We regressed the brand quality factor, the seller reputation factor, the contrast codes from table 1, and all possible two- and three-way interactions on final sales price. Unsurprisingly, participants were willing to pay more for the high-quality brand ($M = \$0.93$) than the low-quality brand ($M = \$0.71$; $F(1, 209) = 10.54$, $p < .01$) and for a product sold by a seller with a good ($M = \$0.89$) versus a poor reputation ($M = \$0.75$; $F(1, 209) = 3.73$, $p = .05$). This second finding is consistent with past research showing that sellers with better reputations generally see higher prices for their goods at auction (Ba and Pavlou 2002; Bajari and Hortescu 2004; Cabral and Hortacsu 2010; Resnick et al. 2006). Most importantly, the only other significant predictor was the contrast code comparing the ambiguous and dissimilar bidder condition to the similar bidder condition. Over and above effects of brand quality or seller reputation, participants were willing to pay a higher final sales price when facing an ambiguous ($M = \$0.97$) or dissimilar ($M = \$0.88$) competitor than when facing a similar competitor ($M = \$0.56$; $F(1, 209) = 22.78$, $p < .001$). No other predictors were significant, including the contrast comparing ambiguous and dissimilar bidders ($F(1, 209) = 1.54$, $p = .22$).

Discussion. In study 2a, we find that when we manipulate both the brand quality of the competition target and seller reputation, we see effects consistent with intuition (higher quality brands and sellers with better reputations lead to higher prices). However, over and above these effects, ambiguous and dissimilar competitors cue greater aggression than do similar competitors. This result is theoretically important because it shows that the results of study 1 are robust even in a more complex information environment, where other pieces of information might overwhelm information about competitors in driving bidding behavior. It is also practically important, as sellers may sell a range of brands and are dependent on buyers to establish their reputation. In such cases, our findings suggest that sellers can still potentially alter final selling prices in auctions by displaying or hiding bidder information.

In addition to information about brands and sellers, online auctions may also display information about more than one competing bidder. Seeing the identity of more than one competing bidder would not only increase the amount of information a consumer is processing when competing in the auction, it may also lead to reliance on processes different than the inferential mechanism we propose. Specifically, when confronted with multiple competing bidders, consumers may relay on assimilation or contrast processes to fill in missing information. For example, Raghunathan and Irwin (2001) show contrast effects in consumers' product evaluations when evaluating products from the same category and assimilation effects when evaluating products from different categories. If assimilation effects influence inferences about the identity of ambiguous others in competitive contexts, an ambiguous competitor would be inferred to be similar when other bidders are identified as similar and dissimilar when other bidders are identified as dissimilar. On the other hand, if contrast effects drive inferences under competition, an ambiguous bidder would be inferred to be dissimilar when surrounded by similar others and similar when surrounded by dissimilar others. Given our theoretical account, we do not expect either assimilation or contrast effects to occur. Rather, we predict that consumers will infer an ambiguous other to be dissimilar in a competitive context regardless of the identity of other competitors present in the environment. Thus, study 2b tests whether our results hold when participants are exposed to more than one competing bidder, including situations in which they see multiple different types of other bidders in a single auction (e.g., an ambiguous competitor paired with two similar competitors). This context allows us to directly compare our pattern of results against that predicted by assimilation or contrast processes.

Study 2b: Participants and Procedure

A total of 127 undergraduate students at the University of South Carolina participated in this study for course extra credit. In this study, participants were told they might see more than one profile of a competing bidder. Specifically, they read the following: "You will be linked to a network of many consumers bidding on the item, but for sake of this auction, you will only see one or more profiles that are representative of the other bidders. That is, you will not see ALL of the other bidders' profiles, just enough to give you an idea of who you are competing against."

Participants then entered a simulated live auction following the same format as studies 1 and 2a. The auction item was a bottle of Five Hour Energy Drink. Participants were randomly assigned to one of the following four conditions: (1) three similar bidders (SSS), (2) two similar bidders and

an ambiguous bidder (SSA), (3) two dissimilar bidders and an ambiguous bidder (DDA), and (4) three dissimilar bidders (DDD).

Three participants were dropped from further analysis because they chose not to bid on the item at all (i.e., they entered an opening bid of zero), leaving 124 participants in the sample, all of whom bid at least 1 cent (the range for opening bid was \$0.01–\$2.00). As in prior studies, none of the participants bid 10 times ($M_{\text{number of bids}} = 2.19$), and thus none of them won the energy drink. We once again analyze the final selling price for the item ($M = \$1.07$) as an indicator of aggressiveness.

Study 2b: Results and Discussion

Results. Given that this study had four conditions, we employed three contrast codes to demonstrate that our prediction that an ambiguous competitor is treated like a dissimilar competitor holds even when participants are exposed to multiple types of competitors. These codes compare (1) the SSS condition to the SSA condition, (2) the SSA condition to the DDA and DDD conditions, and (3) the DDD condition to the DDA condition. We regressed the final sales price on these three contrasts. We note that because these codes are not orthogonal, Bonferroni corrections are required, such that the critical p-value for all analyses reported in this study is $p < .0167$ rather than $p < .05$.

Table 3 lists these comparisons as well as the predictions that we make based on our theoretical account and the predictions that would be made based on either assimilation or contrast processes. Based on our inference making theoretical account, we expected contrast one to be significant because we expected participants to treat the ambiguous bidder in the SSA condition as a dissimilar competitor, leading them to compete more aggressively in this condition than when they were exposed to three similar bidders. Note that although this prediction would be consistent with a contrast process, it is inconsistent with an assimilation process. We also expected contrast two to be significant; participants who saw two similar bidders paired with an ambiguous bidder should compete less aggressively than those who saw either three dissimilar bidders or two dissimilar bidders paired with an ambiguous bidder. We did not, however, expect contrast 3 to be significant. Given our prediction that participants will treat an ambiguous bidder as a dissimilar bidder, we expected them to compete as aggressively in the DDD condition as in the DDA condition. Note that this prediction is consistent with an assimilation process, but not with a contrast process. Therefore, comprehensive support of our predictions can only be explained by our inference based theoretical account; either assimilation or contrast processes would fail to explain the entire pattern of effects we predict.

Consistent with our predictions, participants competed more aggressively in the SSA ($M = \$0.92$) than in the SSS ($M = \$0.67$) condition ($F(1, 120) = 26.16$, $p < .0001$). Participants also competed more aggressively in the DDA ($M = \$1.35$) and DDD ($M = \$1.29$; $F(1, 120) = 35.96$, $p < .0001$) conditions than in the SSA condition. However, participants competed equally aggressively in the DDD and DDA conditions ($F(1, 120) = 0.24$, $p = .63$). These results indicate that ambiguity is consistently treated like dissimilarity rather than similarity, creating an upward pressure on aggressiveness, regardless of the context in which it appears.

Discussion. The results of study 2b suggest that inferences about ambiguity in competitive contexts are more consistent with our inference-based explanation than with an assimilation or contrast process. Regardless of whether an ambiguous bidder appears alongside dissimilar or similar bidders, ambiguous others lead to levels of aggressiveness more like that generated by dissimilar others than that generated by similar others. We note that although we did not identify the current "highest" bidder on each round of bidding (i.e., was it the similar, dissimilar, or ambiguous competitor), we would anticipate that when the current highest bidder is dissimilar or ambiguous, an individual would be more motivated to place another bid than when the current highest bidder is similar. Overall, study 2b demonstrates that the basic effect we propose is robust to contextual influences generated by groups of other competitors. However, we have not yet provided direct evidence of our proposed mediation process, inferred similarity to competitors. Study 3 provides evidence that inferences drive our observed effects via both moderation and mediation, as explained next.

TABLE 3

STUDY 2B: CONTRAST CODES AND PREDICTIONS OF AGGRESSIVENESS BASED ON ASSIMILATION PROCESSES, CONTRAST PROCESSES, AND THE PROPOSED INFERENCE-BASED THEORETICAL ACCOUNT

	SSS condition	DDD condition	SSA condition	DDA condition	Assimilation prediction	Contrast prediction	Inference-based prediction
Contrast code 1: SSS vs. SSA	1	0	−1	0	Equal	SSA > SSS	SSA > SSS
Contrast code 2: SSA vs. DDA and DDD	0	−1	2	−1	DDA and DDD > SSA	DDA and DDD > SSA	DDA and DDD > SSA
Contrast code 3: DDD vs. DDA	0	1	0	−1	Equal	DDD > DDA	Equal

STUDY 3: MODERATION AND MEDIATION

In study 3, participants participated in an auction on a website whose name indicated that other competitors were likely to be similar to the participant or whose name provided no contextual cues about the likely similarity of competing bidders. We predicted that because providing an external cue about the similarity or dissimilarity of other bidders removes the need to make inferences about the identity of ambiguous others, previously observed effects would no longer emerge. We also collected a direct measure of inferred similarity to other competitors in order to provide a direct test of our proposed mediation. Unlike the auctions in studies 1 and 2, study 3 follows a penny auction format, which allows an alternate measure of bidding aggressiveness, discussed below.

Participants and Procedure

A total of 183 undergraduate students at the University of South Carolina participated in this study for course extra credit. All participants were told that they would be given the chance to bid in a "beta test" of a new online penny auction system. All participants read the following description of the penny auction process: "This auction will proceed like the 'Penny Auctions' that are popular on many Internet websites . . . . An item starts out at a certain reserve price. Each bid you make will increase the bid price of the item by 1 cent. However, it costs 25 cents to make a bid . . . . Remember, the cost of the item is only increasing 1 cent for each bid, but you have to pay 25 cents in order to submit a new bid."

Half of the participants were then told that the beta test was for a website called "Gamecock Auctions" (Gamecocks is the name of the University of South Carolina mascot), while the other half were told that the beta test was for "eBay Auctions." The website name in the Gamecock auction condition cued participants that other bidders were also likely affiliated with their university (and hence relatively similar to themselves, given that they shared a membership reference group; see, e.g., Bearden and Etzel 1982; Escalas and Bettman 2003). By contrast, the eBay auction condition provided no cues about the likely similarity of other bidders. All participants were then shown a photo of the item they would be bidding on, a University of South Carolina baseball hat, the reserve price of $7.99, and a profile of a competing bidder. The profiles used were slightly different than those used in prior studies; the main difference was that dissimilarity was manipulated by indicating that the dissimilar other was a nonstudent adult (see table A2 for details). Thus the study employed a 2 (auction website name: similarity cue present vs. absent) × 3 (competing bidder: similar vs. dissimilar vs. ambiguous) design.

Once participants began the auction, they were allowed to bid on the hat up to 10 times. A total of 11 participants were dropped from further analysis because they chose not to bid on the item at all. After these nonbidders were removed, 172 participants were left in the sample. As in prior studies, the fictitious competing bidder always bid on the item after the participant did, so that participants always had to bid in order to win the item. None of the participants bid 10 times ($M_{\text{number of bids}} = 3.25$), and thus none of them won the hat. Due to the nature of penny auctions, the "price" paid by participants reflects not only the price of the underlying good (which rises in increments of 1 cent) but also their cost to bid (which rises in increments of 25 cents). As has been argued by critics, this distorts the interpretation of prices in such auctions (McCarthy 2011; Zimmerman 2011). For this reason, in this study we focus on number of bids as our measure of aggressive behavior. To test our mediation hypothesis, when the auction was over, participants were asked to rate, on a 9-point scale anchored by "not at all similar" and "very similar," "How similar do you think your taste in products is to the taste of the person against whom you were bidding?"

Results

We first regressed the contrast codes in table 1, the auction website name factor (similarity cue present vs. absent), and the interaction of the auction website name factor with both contrast codes on inferred competitor taste similarity. The results revealed a main effect of auction website name, such that participants inferred their competitor to have more similar tastes to their own in the Gamecock condition than in the eBay condition ($M_{\text{Gamecock auction}} = 5.92$, $M_{\text{eBay auction}} = 4.57$; $F(1, 166) = 43.97$, $p < .0001$). There were also main effects of both contrast codes, indicating that dissimilar ($M = 3.00$) and ambiguous ($M = 5.10$) competitors were inferred to be less similar to the self than was a similar competitor ($M_{\text{similar}} = 7.70$; $F(1, 166) = 292.55$, $p < .0001$) and that a dissimilar competitor was inferred to be less similar to the self than was an ambiguous competitor ($F(1, 166) = 68.04$, $p < .0001$).

Importantly, however, these main effects were qualified by interactions between the auction website name factor and both contrast codes ($F(1, 166) = 27.94$, $p < .0001$, and $F(1, 166) = 77.79$, $p < .0001$, respectively), indicating that inferences of an ambiguous competitor's tastes depend on the similarity cues provided (or not provided) by the auction website's name. Follow-up analysis in the eBay auction condition (using the contrast codes in table 1) revealed that an ambiguous and dissimilar competitor were inferred to be significantly less similar to the self than was a similar competitor ($F(1, 81) = 221.62$, $p < .0001$), and an ambiguous and dissimilar competitor were inferred to be equally (dis)similar to the self ($F(1, 81) = 0.14$, $p = .71$). In contrast, follow-up analysis (using the alternate codes from table 2) in the Gamecock auction condition (in which participants expected ambiguous others to be similar to the self) revealed the opposite effect: similar and ambiguous competitors were inferred to be more similar to the self than was a dissimilar competitor ($F(1, 85) = 244.55$, $p < .0001$), and an ambiguous and similar competitor were inferred to

be equally similar to the self ($F(1, 85) = 1.89$, $p = .17$; see fig. 2).

A similar pattern of effects was obtained for number of bids. Specifically, the results revealed a main effect of website name, such that participants made fewer bids against their competitor in the Gamecock auction condition than in the eBay auction condition ($M_{\text{Gamecock auction}} = 3.00$; $M_{\text{eBay auction}} = 3.51$; $F(1, 166) = 7.32$, $p < .01$). There were also main effects of both contrast codes, indicating that participants made more bids against a dissimilar ($M = 3.98$) or ambiguous ($M = 3.23$) competitor than against a similar competitor ($M_{\text{similar}} = 2.54$; $F(1, 166) = 29.02$, $p < .0001$) and that participants made more bids against a dissimilar competitor than against an ambiguous competitor ($F(1, 166) = 10.12$, $p < .01$). Importantly, we also found an interaction between the auction website name factor and the second contrast code ($F(1, 166) = 5.06$, $p < .05$), indicating that the number of bids a participant made against an ambiguous versus dissimilar competitor depends on the similarity cues provided in the auction website name, supporting hypothesis 3b. Follow-up analysis in the eBay condition (using the contrast codes shown in table 1) revealed that participants made more bids against an ambiguous or dissimilar competitor than against a similar competitor ($F(1, 81) = 27.45$, $p < .001$) and made an equal number of bids against an ambiguous and dissimilar competitor ($F(1, 81) = 0.07$, $p = .79$), thus replicating previous results and supporting hypothesis 1. In contrast, follow-up analysis in the Gamecock auction condition (using the alternate contrast codes shown in table 2) revealed the opposite effect: participants made fewer bids against a similar or ambiguous competitor than against a dissimilar competitor ($F(1, 85) = 21.11$, $p < .0001$) and made an equal number of bids against a similar and ambiguous competitor ($F(1, 85) = 0.34$, $p = .56$).

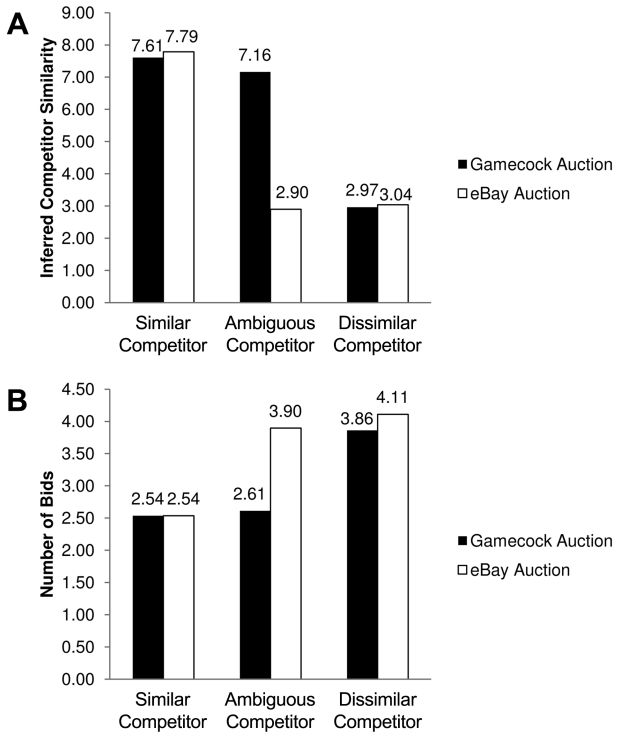
Finally, we determined whether the ambiguous versus dissimilar competitor contrast code × auction website name interaction was mediated by inferred similarity, as predicted in hypothesis 2. We first confirmed that inferred similarity predicts number of bids ($F(1, 170) = 37.26$, $p < .0001$, such that greater dissimilarity lead to a higher number of bids). Then we ran a model in which inferred similarity is added to the other independent variables used to predict number of bids. In this model, the ambiguous versus similar contrast code × auction website name interaction is no longer significant at the $p < .05$ level ($F(1, 165) = 1.94$, $p = .054$), indicating partial mediation (Baron and Kenny 1986).

Discussion

Study 3's results provide support for hypotheses 1, 2, and 3b. When the auction website name provides no cues about the similarity of competing bidders, participants make inferences about an ambiguous other's identity that are consistent with their competitive mind-set, leading them to bid more aggressively, as in prior studies. The moderation of this effect by external similarity cues supports our argument that inference making drives our findings: if an external cue indicates that competing bidders are likely to be similar to the self, participants no longer need to rely on inferences to determine similarity. Rather, this similarity cue leads them to bid *less* aggressively against ambiguous as opposed to dissimilar others. We also show that effects on bidding aggressiveness are mediated by similarity inferences via direct measurement.

FIGURE 2

STUDY 3: INFERRED COMPETITOR SIMILARITY AND NUMBER OF BIDS BY AUCTION WEBSITE NAME, AND COMPETITOR TYPE; *A*: INFERRED COMPETITOR SIMILARITY, *B*: NUMBER OF BIDS



Note that this study presents a fairly conservative test of our hypotheses, given that in both the Gamecock auction and the eBay auction conditions, the university's logo on the product could have served as a similarity cue about other bidders. However, this weak cue about possible bidder identity did not appear to alter aggressiveness in the face of ambiguity. Labeling the auction site itself with the university's mascot did, however, appear to signal that ambiguous others were likely to be similar to the self, thus moderating the tendency to behave aggressively against ambiguous others. To ensure that this was indeed the case, and that manipulating website name affected only similarity inferences of ambiguous others and not perceptions of how cooperative or competitive the auction itself was, we asked 114 participants to read about a penny auction website either labeled with their university's mascot name or eBay, as in the main study. We then asked them to indicate how likely (on a 7-

point scale) other bidders on the site were to "like the same kinds of products you like" and to "share [your] tastes and preferences" ($r = .75$). We also asked participants to indicate "how competitive" auctions on the website would be on a 7-point scale. While participants in the mascot auction condition thought other bidders were significantly more similar to the self (using an average of the two similarity measures; $M = 4.47$) than did participants in the eBay auction condition ($M = 3.96$; $F(1, 112) = 5.90$, $p < .0001$), perceptions of competitiveness did not differ by website name ($M_{\text{mascot auction}} = 5.66$; $M_{\text{eBay auction}} = 5.67$; $F(1, 112) = 0.00$, $p = .96$).

We also note that in this study the dissimilar other bidders could have been inferred to have higher incomes, being older than most of our participants. Winning would therefore require higher bids than would winning against other bidders who are similarly impoverished college students. While this might explain the fact that bidding was more aggressive against a dissimilar versus similar bidder, it does not explain the fact that ambiguity created aggressiveness greater than that created by similarity. Finally, we also note that because we used a penny auction in this study, bidders were incurring most of their cost simply in order to bid. For example, a bidder who bid 1 cent 10 times in this auction (at a cost of 25 cents per bid and a starting price of $7.99) would end up paying a price of $8.09 and $2.50 in bidding fees, for a total cost of $10.59. Reported prices for products often focus only on the reserve price and penny portion of the bid (i.e., the $8.09 cost) and fail to disclose the amount that participants paid in bid costs. As a result, the ethicality of penny auctions has been widely challenged (Komando 2011; McCarthy 2011; Zimmerman 2011). Replication in this context therefore suggests that our effects are robust even when costs of competition itself are irrationally high relative to the cost of the good.

STUDY 4: INTEGRATING SELLER AMBIGUITY

We have argued that interpersonal similarity, whether known or inferred, cues aggressiveness in competitive settings. To this point, we have focused on similarity to other competitors. As other individuals are the chief factor in any competition (and, in fact, competition cannot exist without negative dependence among competitors' goals), this focus allows generalization of these findings to a broad spectrum of competitive contexts.

However, particularly in auction settings, consumers may also have information about their similarity or dissimilarity to the seller of the good. The question of how seller identification or ambiguity may interact with that of other buyers is largely empirical, though it can be informed by past work on seller reputation. In general, sellers with better reputations garner slightly higher bids than sellers with worse reputations (Ba and Pavlou 2002; Bajari and Hortacsu 2004; Cabral and Hortacsu 2010; Resnick et al. 2006) because seller information offsets the risk associated with the transaction (Barney and Hansen 1994; Standifird 2001). We propose that seeing a seller who is identified as similar to the self will create a comparable amelioration of risk for consumers. Because individuals tend to see themselves as good people, they will infer that a similar seller will likewise be honest and fair (Dunning, Meyerowitz, and Holzberg 1989; Lewicki 1983). Thus, they have no salient concerns about the trustworthiness of the seller. As such, the identity of other bidders will therefore remain the primary cue for aggressiveness. In such cases, we should see the same pattern of effects as seen in prior studies.

However, given that auctions are inherently competitive, our framework would also propose that ambiguous sellers will lead individuals toward inferences of seller dissimilarity rather than similarity. How would this inference about the seller change the effect of bidder identity or ambiguity? Prior work argues that negative reputation information has a stronger influence on bidding than does positive reputation information because it heightens concerns about risk associated with the transaction (Standifird 2001). Similarly, we propose that inferred or known dissimilarity draws attention to the seller, identifying him or her as a potentially dangerous member of an out-group (Smith 2007). This shift in attention will reduce the importance of bidder identity in driving aggressiveness. Note that this focus on the seller as the target of aggression would lead to different effects on prices than seen in our prior experiments, since consumers display aggressiveness toward sellers by exhibiting different behavior than when displaying aggressiveness toward other bidders. Recent work in auctions suggests that when buyers wish to collude against a seller, they do so by keeping auction prices as low as possible for as long as possible (Ockenfels and Roth 2002). This type of activity could be considered a kind of "coalitional violence," a form of aggressiveness where otherwise competitive individuals bind together to harm a shared enemy (Liddle, Shackelford, and Weekes-Shackelford 2012). In general, we would therefore anticipate that when sellers are known or inferred to be dissimilar, consumers will be less intent on beating one another to get the product and more intent on emerging from the transaction in a better net position than the seller. Thus, aggressiveness toward a dissimilar or ambiguous seller would be manifest in lower willingness-to-pay for the auctioned good relative to that seen when a similar seller is faced.

Participants and Procedure

A total of 194 undergraduate students at the University of South Carolina participated in this study for course extra credit. The auction procedure was identical to studies 1 and 2a except that (1) participants were shown both a bidder profile and a seller profile before beginning the auction, (2) participants were given $2.00 cash at the beginning of the experiment that they were told they could use when bidding, and (3) the item up for bid was changed to a Snickers candy bar (2.07 oz.). Participants entered a simulated live auction for the Snickers bar in which they were in one of nine conditions, based on a fully crossed 3 (competing bidder:

similar vs. dissimilar vs. ambiguous) × 3 (seller: similar vs. dissimilar vs. ambiguous) design. One participant was dropped from further analysis because they chose not to bid on the item at all (i.e., they entered an opening bid of zero), leaving 193 participants in the sample, all of whom bid at least 1 cent (the range for opening bid was \$0.01–\$1.00). As in prior studies, none of the participants bid 10 times ($M_{\text{number of bids}} = 1.46$). We once again analyze the final selling price for the item ($M = \$0.54$) as an indicator of aggressiveness.

Results

To analyze these data, we first ran an omnibus analysis regressing the final selling price on the three-level seller variable, the three-level competitor variable, and their interaction. This analysis revealed a main effect of both competitor type ($M_{\text{ambiguous}} = \$0.61$; $M_{\text{dissimilar}} = \$0.65$; $M_{\text{similar}} = \$0.34$; $F(2, 184) = 12.71$, $p < .0001$) and seller type ($M_{\text{ambiguous}} = \$0.36$; $M_{\text{dissimilar}} = \$0.37$; $M_{\text{similar}} = \$0.87$; $F(2, 184) = 37.49$, $p < .0001$) but, most importantly, also revealed a significant interaction of these two factors, as shown in figure 3 ($F(4, 184) = 8.58$, $p < .0001$). To further understand this interaction, we next analyzed the results across each type of seller separately.

Consistent with hypothesis 1, when the seller is identified as similar, participants were willing to pay more when bidding against an ambiguous ($M = \$1.11$) or dissimilar ($M = \$1.15$) competitor than they were when bidding against a similar competitor ($M = \$0.35$; $F(1, 99) = 11.11$, $p < .01$), indicating greater aggressiveness. There was not a significant difference in willingness to pay when bidding against an ambiguous versus dissimilar competitor ($F(1, 163) = 0.04$, $p = .84$). In contrast, in situations in which the seller is identified as dissimilar or is ambiguous (and therefore inferred to be dissimilar), there was no significant effect of competitor type in either the ambiguous ($F(2, 59) = 0.02$, $p = .98$) or dissimilar seller condition ($F(2, 62) = 1.39$, $p = .26$).

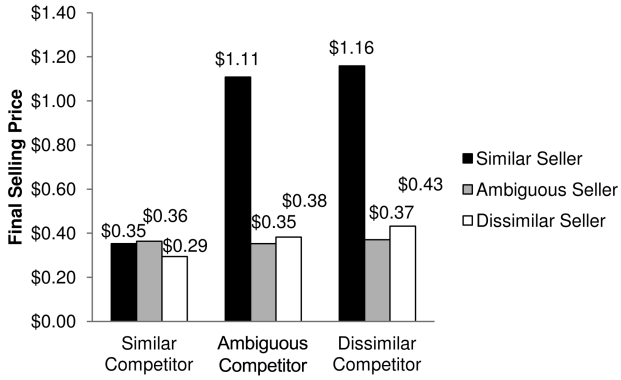
Further, using contrast codes analogous to those in table 1 (but comparing seller identity instead of bidder identity) we found that final selling prices were significantly higher in the similar seller condition ($M = \$0.87$), indicating less aggression toward the seller, compared to the ambiguous ($M = \$0.36$) and dissimilar seller conditions ($M = \$0.37$; $F(1, 190) = 57.84$, $p < .0001$). There was, however, no difference in selling prices across the ambiguous and similar seller conditions ($F(1, 62) = 0.01$, $p = .91$).

Discussion

Study 4 explored the interaction of seller identification with the identification of one's competitors in an online auction. Interestingly, prior patterns of results are replicated when the seller is identified as similar to the competitor. Our other experiments likely led to this inference, as undergraduate participants took part in an auction directed by either young American PhD students or undergraduate research assistants, who were likely perceived as similar to participants. The results of study 4 suggest that absence of identifying information about a seller appears to cue aggression toward the seller at a similar level as does identification of the seller as dissimilar. Because competition with a seller means a desire to pay them the lowest possible price for a good, ambiguous sellers yield lower prices than similar sellers and approximately equivalent price levels to that generated by dissimilar sellers. Although a full exploration of this shift in the focus of competition from other bidders to the seller is beyond the scope of the present paper, we propose that future work may fruitfully explore the ways in which competitive focus shifts between one's competitors and the entity acting as the "seller" (which could be an individual, as in our study, or a firm) in competitive settings. Our research suggests that consumers determine the focus of their aggression based on the amount and type of identification provided about other players in their competitive context.

FIGURE 3

STUDY 4: FINAL SELLING PRICE BY COMPETITOR TYPE AND SELLER TYPE



GENERAL DISCUSSION

The tendency to infer that others are like us has often been depicted as second-nature. However, five studies demonstrate that competitive situations or mind-sets may override this tendency, such that ambiguous others are inferred to be and are treated as though they are different from us, leading to more aggressive behavior and, in the case of auctions, higher prices, than those generated by similar others. This pattern exists regardless of brand quality and above effects associated with seller reputation. Further, results from a multiple-bidder context are consistent with our inference-based theory but cannot be explained by either an assimilation or contrast paradigm. We also show moderation consistent with our theoretical account. When individuals are in a cooperative mind-set, they show behaviors consistent with egocentric bias tendencies. Further, while our effects

hold when a seller is believed to be similar to a given consumer, if a seller's identity is ambiguous or dissimilar, competitive focus appears to shift toward obtaining the good at the lowest price possible and the effect of other buyers' identities is reduced.

Theoretical and Practical Implications

Our findings first provide a challenge to the primacy of egocentrically driven biases (Dunning and Cohen 1992; Marks and Miller 1987; Naylor et al. 2011, 2012; Ross et al. 1977), suggesting an unobserved confound in prior research: while egocentric inferences are robust when individuals are in a neutral or cooperative stance toward one another (for example, the collaborative online review process in the Naylor et al. 2011 studies), competitive contexts invert consumer tendencies to use the self as a basis for inference making. We also contribute to recent work exploring product and context-related features that determine willingness-to-pay in auctions, one of which is the competition between buyers (Chan et al. 2007). Competition between buyers is inferred in Chan et al.'s (2007) work based on past price information for similar products or the presence of a buy-it-now option, but no consideration of interpersonal similarity or ambiguity is included. We suggest that perceived or inferred similarity may play an important role in explaining prices. Also, in most prior work exploring auctions, individuals are proposed to rely on past experience to develop expectations about other bidders' behavior (e.g., Bajari and Hortacsu 2004). Our work suggests that past experience is, in fact, not necessary to determine bidder aggressiveness. Rather, consumers make inferences about the identity of other bidders and use these inferences to determine their own behavior.

In addition to the theoretical contributions this research makes to the literature on egocentric biases and inferences of ambiguous others, our results also yield prescriptions for marketers and consumers. Findings first suggest that marketers may wish to maintain bidder ambiguity when consumers compete for a product (because of the tendency for ambiguity to increase selling prices). Marketers may also note that sellers can benefit from revealing themselves as similar to the consumer, given that seller similarity results in higher prices paid by bidders. At the same time, consumers should be aware of the effects that identification or ambiguity may have on their behavior. In particular, consumers should seek to temper their tendency to pursue their desired good more aggressively when competing with either ambiguous or dissimilar others, since consumers appear to be willing to pay more for the same good when this type of social influence comes into play. Further, they may wish to consider how their own decision to provide identity-related information or maintain ambiguity may affect other bidders' behavior, and, with it, the prices they will need to pay to obtain a desired good. Tempering such tendencies may help to decrease post-purchase regret and preserve the auction as an opportunity to save rather than to overspend.

Our findings also raise an interesting ethical question: Does altering the identity or ambiguity of other bidders change prices in ways that may be exploitative? We note that in our studies, the highest prices bid by participants were not, on average, above the list price for the focal product. For example, the list price for Five Hour Energy Drink is between $1.50 and $2.10 a bottle. None of our studies showed mean final bids anywhere near this level. Thus, it does not appear that identity-based inferences lead to widespread irrationality, but rather variance in the amount an individual is willing to pay while still remaining under the threshold of a nonauction value. To conclude that using identity-based inferences to alter aggression is innocuous, this effect would need to be replicated in other contexts, especially those where bidders have high interest in the products being auctioned. Still, the price levels observed in our data may suggest that identity-based inferences do not constitute a predatory or abusive means of driving up prices or aggressiveness beyond rational levels. If irrational aggression is observed in some contexts, our results offer some remedies to these effects, in that either activating a cooperative mind-set or highlighting external similarity cues can reliably reduce the possibility of hypercompetition.

Limitations and Future Directions

Though we have argued that auctions offer an ecologically valid and theoretically appropriate context in which to study aggressiveness, they also required us to hold constant some elements that future research could vary in order to gain further insight. For example, the "products" for which individuals compete can take on much more complex and multifaceted aspects than the goods we considered in our studies. For example, consumers may compete for improvements in their standard of living (i.e., "keeping up with the Joneses"). In such cases, others' standard of living may present a baseline from which to gauge one's success (e.g., Ordabayeva and Chandon 2011), but their similarity or ambiguity to the self may not cue aggressiveness in the same way. Auctions for very specialized goods may also result in different effects, as the specialized nature of the product may cue the identity of ambiguous others, much like the mascot website name in study 3. Further, study 3 shows only partial mediation of inferences of taste similarity. Thus, future research may (1) examine differently structured competitive contexts or product types to see what factors may enhance or decrease the importance of competitor identity and (2) further explore inferences about ambiguous others in competitive contexts that may be driving aggressiveness, including not just similarity of taste in products, but also similarity related to demographics or psychographic traits.

We note, too, that though seller identification may be important in auction contexts, not all competitive contexts have "sellers." For example, when employees compete for workplace advancement, there may be no direct analog to a "seller," since an employee would simply not succeed by withholding effort or time from their employer. In such contexts, it may be more difficult to moderate the effects of ambiguity by changing "seller" identity.

Further, in online auction contexts bidders are unlikely to have extensive interaction with competitors outside a given auction. Future research may consider domains where competition may occur repeatedly among the same individuals. Here, the relationship between identification and aggressiveness may take on a more complex form. For example, consider collectors who regularly compete in auctions for hard to find items (e.g., sports memorabilia, coins, art). Based on our findings, such individuals may compete more aggressively if they do not spend a great deal of time around other collectors who share their own in-group status. In fact, if one is preparing to bid for such items, actively communicating one's similarity to other collectors against whom one is likely to be bidding may result in lowered aggressiveness and lower prices paid by all. By contrast, if one is selling such items, communicating similarity may actually result in increased prices paid.

Finally, we note that none of our participants actually won the focal good. Future research may allow participants to achieve varying levels of objective success or failure in the course of a competition. Such a setup would help determine whether inferring dissimilarity is adaptive in competitive settings, such that individuals making this inference not only compete more aggressively, but more effectively.

In sum, this work offers an important boundary condition for the tendency to infer that ambiguous others are similar to the self (Dunning and Cohen 1992; Marks and Miller 1987; Naylor et al. 2011, 2012; Ross et al. 1977). In demonstrating the effect of competitive contexts on inferences about ambiguous others and how these inferences affect behavior in online auctions, we also present a preliminary framework for understanding the effect of social influence on competitive behavior. We look forward to future work that will further enrich this model, considering different determinants of competitiveness, inference making strategies, and alternate dependent measures.

APPENDIX

TABLE A1

PROFILES OF SIMILAR AND DISSIMILAR OTHERS USED IN PILOT STUDY AND STUDIES 1, 2, AND 4

	Similar	Dissimilar
Gender	[Same as participant]	[Different from participant]
Hometown	Columbia, SC	Eugene, OR
Current location	South Carolina	Oregon
University	University of South Carolina	University of Oregon
Major	Business	Engineering
Greek	[Same as participant]	[Different from participant]

The vast majority of participants in all studies were business majors. In order to maximize (dis)similarity, participants first indicated their gender and whether they were a member of a Greek organization on campus (i.e., a fraternity or sorority) before completing each study so that participants in the similar condition saw a responder of the same gender and Greek status (yes or no) and participants in the dissimilar condition saw a responder of the opposite gender. All studies were conducted at the University of South Carolina except the pilot study, which was conducted at the Ohio State University; the pilot study therefore showed the similar participant living in Columbus Ohio and attending Ohio State. In the ambiguous condition, participants in the pilot study were told that no profile was available for the responder with whom they had been paired. In studies 1, 2, and 4, participants saw a bidder or user ID only (a bidder or user ID was also shown for the similar and dissimilar competitors in these studies). In study 2b (where more than one similar or dissimilar profile was used) participants saw multiple profiles of (dis)similarity varied by geographic location.

TABLE A2

PROFILES OF SIMILAR AND DISSIMILAR COMPETING BIDDERS USED IN STUDY 3

	Similar bidder	Dissimilar bidder
User ID	RR1378	RR1378
Age	20	42
Occupation	Student	Employed full-time
Hometown	Columbia, SC	Eugene, OR
Current location	South Carolina	Oregon
Gender	[Same as participant]	[Different from participant]
Birth date	June 2, 1990	June 2, 1968
University attended	University of South Carolina	University of Oregon

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