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Abstract

Information that sits in first position is remembered better, disproportionately influences interpretation of subsequent material, produces greater attachment, and persuades more effectively. Similar among some of these effects is the core component of affect along a good-bad dimension. Thus, firsts should also be preferred more. We report the first evidence for a new effect titled "first is best" – what comes first is liked or preferred more. In six experiments, participants viewed in serial order two stimuli in each of several categories: horses, teams, salespeople, lollypops, chewing-gum, and criminals. Measures of automatic (i.e., implicit measures and a time-constrained choice task) but not deliberative (i.e., explicit) preference showed that the first of a pair was consistently preferred over the second. The first in a series also affected choice of product (e.g., the first chewing gum was chosen over the second) and emerged even when the stimulus was negative at baseline – criminals viewed first was more strongly associated with "deserving of parole." Together, six studies demonstrate a new effect "first is best" although no conclusive interpretation of such a bound on rational behavior is offered.

First is Best

You walk into a room and meet Maxine, then Max. In a grocery store, your eyes first notice Bosc pears, then Bartlett pears. Your stockbroker tells you about a new stock option Bentametrix, then Mentametrix. It is a fact of human experience that knowledge of the world is encountered sequentially, making the positioning of information as the arrival chain an important variable in decision-making. There is no reason, at least not a rational one, for preference to be guided by the order in which items in a series are encountered. Max and Maxine are equally likely to be good people, Bartlett pears are no less nutritious than Bosc, and Mentametrix is just as likely to be a smart stock choice as the alternative. We know that our preferences and choices ought to be guided by the actual worth of the option rather than by its position in the sequence in which it cognitively connects. However, as the last half century of research on judgment and decision-making has shown, preferences are not guided by rational considerations alone (Gilovich, Griffin, & Kahneman, 2002; Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980; Simon, 1959; Thaler, 1980).

In humans and other animals, primacy has power – that is, undue emphasis is placed on the first instance encountered in a series. In both rats and humans, what is experienced first is remembered better (Ebbinghaus, 1885; Insko, 1954; Miller & Campbell, 1959; Pineño & Miller, 2005). For example, in a short list of words, the first words are more likely to be recalled at test. Early work on impression formation showed that first trait terms in a list influence impressions more decisively (Asch, 1946; Jones, Rock, Shaver, Goethals, & Ward, 1968; Krosnick, & Alwin, 1987; Luchins, 1957). In this work, a social target described as fun, smart, aggressive, and cheap (positive traits listed first) would be rated more favorably than the same social target described as cheap, aggressive, smart, and fun (negative traits listed first).

Other research showing the power of primacy have an affective base. For example, research on filial imprinting in baby chicks shows that firsts—whether animals or inanimate colored objects—are more likely than seconds to be preferred and produce attachment (Bolhuis, & Bateson, 1990; Jaynes, 1957; Johnson, 1992). At the core of imprinting and attachment is a basic preference. Other work has shown this more directly. One study showed that names of team-members first encountered were more preferred and more strongly associated with the self (Greenwald, Pickrell, & Farnham, 2002). However in this study, a good deal of effort was explicitly engaged in order to memorize the team-member names and the authors' hypothesized that the subsequent effects on preference and self-identification were possibly due to enhanced memory for those team-member names. Similarly, research on persuasion shows that first-positioned arguments have more persuasive appeal and are likely to change minds more (Jersild, 1928; Knower, 1936; Lund, 1925). Finally, Miller and Krosnick (1998) showed that political candidates listed first on a ballot were more likely to be elected. In an analysis of 1992 election returns in Ohio, candidates listed first were advantaged by an average of 2.5%. These effects were exacerbated in counties where voters were less knowledgeable.

Thus, volumes of research suggest that those options that come first are privileged. Further, findings showing firsts create more attachment, voter preference, and are more persuasively appealing suggests that the influence of primacy is not simply found on cognitive endeavors. Indeed, these findings suggest there may sometimes be a base, affective component to the power of firsts.

In this paper we test a new effect involving "first" -- that the first item encountered in a series is evaluatively privileged, i.e., that first is liked more, along a fundamental good-bad dimension. Such a preference, because it makes little rational sense, may be detected on

measures of implicit (if not explicit) evaluation and on actual choice, rather than when asked the direct question of what is preferred. "First is best" (FIB) was tested in six experiments using a variety of stimuli (horses, salespeople, and teams) to establish the generality of the effect. As well, we tested the effect of position on preference for consumer products (lollypops, chewing gum, and bubblegum) by measuring choice behavior (rather than automatic association to "good"), and relative preference between two nefarious characters to rule out the possibility that first position merely polarizes baseline evaluation.

Experiment 1

Method

Participants and procedure. All procedures were approved by the Committee for Use of Human Subjects at Harvard University. A photograph of a horse was photo-edited to produce two different images (randomly assigned the name "Rod" and "Red"). Four different views of each horse were created. Red and Rod were shown sequentially for 4 seconds per view (a total of 16 seconds each). Forty-two participants viewed the two horses in sequence and then completed implicit and explicit measures of preference. Implicit, or automatic, preference was measured with the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT assessed the degree to which Red versus Rod were associated with positive and negative attributes, with order of pairings (Red+Better; Rod+Worse) counterbalanced. The difference in average response latency to the paired blocks was divided by the pooled *SD* yielding an index of implicit preference (D-score; Greenwald, Nosek, & Banaji, 2003).

Explicit, self-reported, preference was measured with: (a) a 7-point scale labeled "I strongly prefer Red to Rod," to "I strongly prefer Rod to Red"; (b) two "feeling thermometers" of Red and Rod preference from 0 (*cold*) – 100 (*warm*); the difference between the two

thermometers was *z*-scored and averaged with the *z*-scored 7-point rating item. Both explicit and implicit measures contained a midpoint of zero indicating no preference.

Results and Discussion

Consistent with our hypothesis, participants preferred the horse viewed first rather than second on the implicit measure, $F(1, 38) = 5.42$, $p < .03$; Cohen's $d = .75$ (Figure 1). There was no such effect of primacy on self-reported preference, $F(1, 32) = .01$, $p = .94$; $d = .04$. Findings suggest that this preference only exists on an automatic, or implicit level and this fairly irrational bias may be corrected using more conscious mental processes.

Experiment 2

In Experiment 2 we tested the effect again, this time counterbalancing order of the implicit and explicit preference measures, because absence of the FIB effect on the explicit measures may have been due to its consistent second position. Additionally, we tested FIB with human stimuli in tasks that are both more commonplace and consequential for the decision-maker.

Method

Participants and procedure. One hundred thirty-two participants were presented with pairs of teams (the "Hadleys" and the "Rodsons"), male salespersons ("Jim" and "Jon"), and female salespersons ("Lisa" and "Lori"), using four picture exemplars of each (a within-participants design across the three tasks). Team-member names were balanced for word-length and letter usage and faces were balanced within pair for attractiveness and emotional expression. The names Jim/Jon and Lisa/Lori were randomly assigned to photographs. Participants were presented sequentially with two items within each pair. Order of pairs and preference measures (implicit, explicit) were counterbalanced. Ordering of the implicit preference measure's pairings

(e.g., Lisa+Better and Lori+Worse versus Lisa+Worse and Lori+Better) was also counterbalanced.

Results and Discussion

Repeated measures ANOVA across pairs revealed a main effect of primacy on implicit preference. First items viewed elicited greater preference than items viewed second, $F(1, 128) = 15.15$, $p < .001$; $d = .70$ (Figure 2). Again, no such effect appeared on the measure of explicit preference, $F(1, 130) = .08$, $p = .78$; $d = .06$.

Data from Experiments 1 and 2 taken together suggest that firsts are preferred to seconds when the stimuli are social agents or creatures. Data also suggest that FIB only emerges on measures assessing automatic preference expressed under time-pressure. To test whether FIB would emerge for non-social objects with an entirely different kind of time-pressured measure, Experiment 3 was conducted.

Experiment 3

In Experiments 1-2, FIB was obtained with four different categories of social stimuli. However, such a result is not tantamount to showing actual choice preference (i.e., which would be selected for ownership?). It was also unclear whether the effect is bounded to social agents or the IAT used as the implicit measure in Experiments 1 and 2. Thus, Experiment 3 was designed to test whether the FIB effect could be harvested from a choice decision about consumer items involving a high time-pressure condition designed to mimic the most critical feature of implicit measures: imposing time constraint rendering the participant unable to consciously reflect upon and potentially regulate response.

Cheap and common primary reinforcers, chewing gum and lollypops, served as the stimuli that would vary in no way other than position of presentation. Actual choice for the item was the dependent variable.

Method

Participants and procedure. All procedures were approved by the Committee for Use of Human Subjects at Harvard University. Twenty participants were recruited from Harvard University in Cambridge, MA. For remuneration they were offered the small consumer item they chose. Two packs of different flavored "Trident" gum, or two different "Blow-Pop" lollypops were placed sequentially on desk in front of participants and participants made their selection fast "within one second or so." First placement of consumer item and side of desk (left vs. right) were counterbalanced. After rapid sequential placement of the two items, participants made their choice quickly. As promised, participants retained the chosen item.

Results and Discussion

A one-way χ^2 goodness of fit tested the effect of primacy (first vs. second) on choice. In line with the FIB thesis, participants choosing under time-pressure chose the consumer item presented first (75%) more often than the item presented second (25%), $X^2(df = 1, N = 20) = 5.00$, $p < .03$. There were no differences observed across the flavors or brands of consumer items.

These data show the FIB effect to generalize to an actual choice behavior which was not reaction-time dependent. Further, these data suggest that primacy influences preference for non-social consumer items in addition to social agents such as horses, people, and teams. However, the true generalizability of FIB to the real world remains an open question. Further, it is possible that this different paradigm (consumer food item, forced choice response format; actual

behavioral choice) would also yield an FIB effect under no time-pressure. Having developed a paradigm in this Experiment that could be taken out of the lab, the focus of Experiment 4 was to test whether FIB could be harvested from a non-college sample making consumer choices in a public setting. Such a demonstration would underscore the likelihood that FIB determines choice and preference in ordinary, everyday life. Both the time-pressure condition used in Experiment 3 and a new no time-pressure condition were used.

Experiment 4

To test the generalizability of FIB, commuters in a busy train station were given the choice task used in Experiment 3. We tested whether the FIB effect could be harvested from a choice decision involving both high (used in Experiment 3) or no time-pressure conditions. As in Experiment 3, high time-pressure was designed to mimic the most critical feature of implicit measures: imposing time constraint rendering the participant unable to consciously reflect upon and regulate response. No time-pressure mimicked explicit measurement in that time was allowed for conscious reflection and response regulation.

Again, a cheap and common primary reinforcer, a piece of sugary chewing gum, served as the stimulus that would vary in no way other than position of presentation. Actual choice for the item was the dependent variable.

Method

Participants and procedure. All procedures were approved by the Committee for Use of Human Subjects at Harvard University and further approved by the facilities manager at the public site. Two-hundred seven participants were recruited from South Train Station in Boston, MA. Adults sitting alone were approached by a research assistant and asked to participate in a study on consumer choice (<1% declined). For remuneration they were offered the small

consumer item they chose. Two pieces of similar-looking bubblegum (1 piece of "Bubble Yum" and 1 piece of "Bubblicious"; equal in size and shape) were placed sequentially on a white clipboard. First placement of gum brand and side of paper (left vs. right) were counterbalanced. After rapid sequential placement of the two items, participants made their choice. As promised, they retained the chosen gum.

In the high time-pressure condition participants made their selection fast "within one second or so" whereas in the no time-pressure condition they picked "after you have really thought about it."

Results and Discussion

A 2 x 2 χ^2 tested the effect of primacy (first vs. second) on choice for each time-pressure condition separately. In line with the FIB thesis, and even in a busy public train station, participants in the high time-pressure condition chose the chewing gum presented first (62%) significantly more often than the gum presented second (38%), $X^2(df = 1, N = 113) = 6.53$, $p < .02$; $d = .49$. Participants in the no time-pressure condition were equally likely to choose the chewing gum presented first (51%) or second (49%), $X^2(df = 1, N = 94) = .05$, $p > .83$; effect size $d = .04$.[1]

Effects observed in this study were smaller in magnitude than effects observed in the controlled version of the task reported in Experiment 3. However, FIB persisted despite wide variability in participants' ages, stress levels, motivations, and mindsets. These data provide further evidence that FIB may affect real-world decision and choice.

Experiment 5

Experiments 1 – 4 demonstrated a FIB effect while leaving open an obvious and plausible alternative explanation. What appears to be FIB may actually be a polarization of the initial

preference state. That is, whatever the baseline evaluative standing of the item, its first position may simply make that evaluation more extreme. All stimuli used in Experiments 1 – 4 were affectively neutral, even mildly positive, making it difficult to conclude that first is really best rather than that first is merely more influential in accentuating whatever may be the baseline evaluation. An obvious test of this alternative explanation is possible, by introducing stimuli that are evaluatively negative and testing whether the item in first position becomes more negative as a function of its primacy. On the other hand, if first is best, then a criminal (a negative stimulus) encountered first should come to be relatively more preferred.

Method

Participants and procedure. All procedures were approved by the Committee for Use of Human Subjects at Harvard University. Two criminals' photographs, from the publicly available Florida Department of Corrections website (www.dc.state.fl.us), were used, depicting 27 year-old White males wearing identical correctional facility outfits. Criminals were pre-tested to be equally attractive and showing neutral facial expressions.

Thirty-one participants learned that evidence suggests that people can make accurate "snap" judgments of others after limited exposure to them and were asked to evaluate two criminals and to determine the better and worse candidate for parole. Participants viewed two criminals, randomly assigned the names Jon and Jim, and completed implicit and explicit measures of preference. Implicit preference measured participants' response-time in associating Jim and Jon with the positive and negative attributes "Better" and "Worse." As in previous experiments, order of pairing (e.g., Jim+Better and Jon+Worse) was counterbalanced. Two explicit preference measures were administered: one asked for a "gut reaction" about the "which

candidate do you judge to be the better candidate for parole?"; the other for a warm-cold judgment of the criminals.

Results and Discussion

In Experiment 5, the criminal encountered first was considered to be the better candidate for parole. The FIB effect on implicit preference was significant, $F(1, 29) = 4.31$, $p < .05$; $d = .77$ (Figure 3). Overall, no effect of primacy on self-reported preference was observed, $F(1, 27) = 1.52$, $p = .19$; $d = .47$. Interestingly, on the "gut" reaction to parole worthiness, first was also better: $F(1, 29) = 4.46$, $p < .05$; $d = .75$. On the thermometer measure no such effect was observed.

The main purpose of Experiment 5 was to test the alternative hypothesis that primacy simply rendered the item in first place more extreme, whatever its initial evaluation. The experiment showed that alternative hypothesis was not viable. Although both individuals were criminals of equivalent stature, the one that was presented first was more strongly associated with positivity and viewed as more fit for parole.

Experiment 6

Experiment 5 suggested that FIB affects extremely important choices which could have an impact on human lives. Before any strong conclusions were reached about such a possibility, it was important to replicate Experiment 5 with an additional, even stricter test of the hypothesis. Thus, Experiment 6 replicated Experiment 5 with a number of modifications: (1) black criminals were used instead of white criminals to further test the generalizability of the effect and to further polarize the negativity of the baseline evaluation (given many individuals show some degree of anti-black bias), (2) order of the IAT and explicit measures were counterbalanced (as in Experiment 2), (3) five different explicit measures were used to explore whether the single

explicit FIB effect observed in Experiment 5 would re-emerge, (4) all explicit measures asked specifically about fitness for parole—not general preference, and (5) the implicit test also measured "parole preference" specifically in which the category labels were "better for parole" and "worse for parole."

Method

Participants and procedure. All procedures were approved by the Committee for Use of Human Subjects at Harvard University. Two criminals' photographs, from the publicly available Florida Department of Corrections website (www.dc.state.fl.us), were used, depicting 29 year-old Black males wearing identical correctional facility outfits. Criminals were pre-tested to be equally attractive and showing neutral facial expressions.

Twenty-four participants (7 Black, 12 White, and 5 "other") were provided the same instructions as in Experiment 5. In Experiment 6, however, the implicit and explicit measures were counterbalanced. Additionally, the implicit measure of parole preference paired Jim and Jon with "Better for Parole" and "Worse for Parole." As in previous experiments, order of pairing (e.g., Jim+Better for Parole and Jon+Worse for Parole) was counterbalanced. There were 5 different explicit questions asked: (1) "gut" judgment that Jim should be released on parole (yes/no), (2) "gut" judgment that Jon should be released on parole (yes/no), (3) "gut" judgment of who should be released on parole? (Jim/Jon), (4) 7-point rating of "gut reaction" to whom should be released on parole (strongly prefer Jim to Jon for parole release – strongly prefer Jon to Jim for parole release), and (5) how warmly do you feel (on a scale from 1-100) toward the idea of Jim being released on parole; how warmly do you feel (on a scale from 1-100) toward the idea of Jon being released on parole (difference between responses served as the relative warmth toward Jim versus Jon).

Results and Discussion

In Experiment 6, the criminal encountered first was considered to be the better candidate for parole. The FIB effect on implicit parole-preference was significant, $F(1, 18) = 4.69$, $p < .05$; $d = .59$ showing that Jim was deemed a better candidate for parole when presented first (IAT D-score = .14) and Jon was a better candidate when presented first (IAT D-score = -.16). There were no FIB effects observed on any of the five explicit parole worthiness measures. Because our sample included a number of non-white participants, we tested the effect of race and found no main effect or interaction (*p*s > .20).

Because an FIB effect on one of the explicit measures used in Experiment 5, five different explicit measures were used in this study to determine whether the effect observed could be replicated on this paradigm involving criminals. No explicit FIB effects were observed for any of the 5 measures: (1) "gut" judgment that Jim should be released on parole ($p > .69$), (2) "gut" judgment that Jon should be released on parole ($p > .43$), (3) "gut" judgment of whom should be released on parole ($p > .69$), (4) 7-point rating of "gut reaction" to whom should be released on parole ($p > .67$), and (5) warmth toward parole release for Jim versus Jon ($p > .51$).

These data offer further evidence to support the idea that FIB persists even when the social consequences are high and only when preference decision is made under time constraint.

General Discussion

In six experiments, with tests using varied stimuli from nine different categories (horses, female salespeople, male salespeople, teams, packages of gum, lollypops, pieces of gum, white criminals, and black criminals), we obtained a result that the first of two items consistently elicited greater preference simply by virtue of its position. Because serially unfolding information is a fundamental feature of experience (Simon, 1979) it is likely to be pervasive

affecting a range of mental operations such as perception, attention, memory, and reasoning. Indeed, firsts: elicit greater attachment (e.g., Jaynes, 1957), make more persuasive arguments (Lund, 1925), are better remembered (Ebbinghaus, 1885), cause stronger impression formation (Asch, 1946), are more strongly linked to the self (Greenwald et al., 2002), and the data presented here suggest that firsts are also more preferred more and chosen more often. That implicit measures of preference consistently detected such an effect is in line with many recent demonstrations of the sensitivity of such measures to information not within introspective access. That a "time pressure" choice task as well as "gut reaction" report also detected the result suggests that the effect is not restricted to a response latency measure of automatic preference; however the latter could not be replicated and should be interpreted with caution. There is growing evidence that implicit preferences play a role in decision-making, even those decisions that are of a consequential nature. Specifically, research shows that automatic, less conscious, preferences predict a variety of brand preferences and consumer behavior (Maison, Greenwald, & Bruin, 2004; Poehlman, Uhlmann, Greenwald, & Banaji, 2007), especially and uniquely those decisions that involve social group-based discrimination contexts (Dovidio, Kawakami, & Gaertner, 2002; Fazio, & Olson, 2003; Poehlman et al.). Most recently, Green, Carney, Pallin, Ngo, Raymond, Iezzoni, and Banaji (2007) showed that doctor's implicit preferences guide treatment decisions for patients from differing social groups, even though explicit statements indicate no desire to treat such patients differently.

The results of these studies are the first in a series of studies that we are exploring to address the many limitations of this first demonstration. Is the FIB effect limited to sets of two or will it emerge in longer sequences? Can better controls be added to the choice task to present

in sequence, remove the options for a time and re-present to see if the FIB effect operates even after a time delay?

With six experiments in hand, we might ask, why is first best? No single account can be offered at present for why exactly first is best, but speculation about various possibilities can be offered. Research on filial imprinting in non-human animals suggests that attachment to the first may have evolved as an adaptive mechanism to help organisms rapidly discriminate between those entities that are safe versus dangerous (Bolhuis & Bateson, 1990; Jaynes, 1957). Research on humans' innate preparedness to prefer their own (mother, family, social group), which is also the one encountered first, may account for the potential adaptive utility of FIB. Further, it may be the case that when the first in a category doesn't harm, it may come to signal a generally safe and positive category. FIB may have derived from the lowering of anxiety attributed to first experiences not leading to harm.

More simply, it may be that FIB derived from observations of phenomena like "pecking order"[2]; the animal that is "best" gets to eat first, the person of highest privilege in a family or group is served first (kings, fathers, guests). Did preference *for* the first confer an advantage in reciprocal preference *by* the first, leading FIB to be naturally selected? Finally, "satisficing" as a decision-making rule places disproportionate importance on earlier items. The strategy is to stop the decision-making search with the first item that crosses a threshold rather than "maximizing," or systematically exploring the entire set prior to making a decision (Simon, 1959).

Each such speculation offers the possibility that a general rule learned to associate first with best for good reason may come to be generalized and applied even when such a strategy is unwarranted. Our future research involves tests to understand the generality of FIB. If some of the above speculations are correct, FIB should emerge with babies, children, in other animals as

well and tests with other primates may be important. Likewise, more tests are needed to unlink the FIB effect from other primacy producing results. For example, unlinking FIB from primacy in memory can be conducted by having later items in a series repeated more often and test whether in spite of better memory for such "recent" items, a preference for first is retained.[3] Of course, discovering how to turn off the FIB bias leading decision-makers astray will also be of interest.

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Footnote

[1]Cochran's test = 4.19, $p < .05$, showed time-pressure condition moderated the relation between primacy and choice such that FIB only emerges under time-pressure.

[2]We thank Joshua Greene for this suggestion.

[3]We thank Jonathan Schooler for this suggestion.

Figure 1. *The main effect of primacy on implicit preference for horses ("Red" vs. "Rod"). A score of zero indicates no preference. The bar on the left represents preference when "Red" was presented first. Positive values indicate an implicit preference for "Red" over "Rod." The bar on the right represents preference when "Rod" was presented first. Negative values indicate a preference for "Rod" over "Red." Error bars indicate standard error of the mean.*

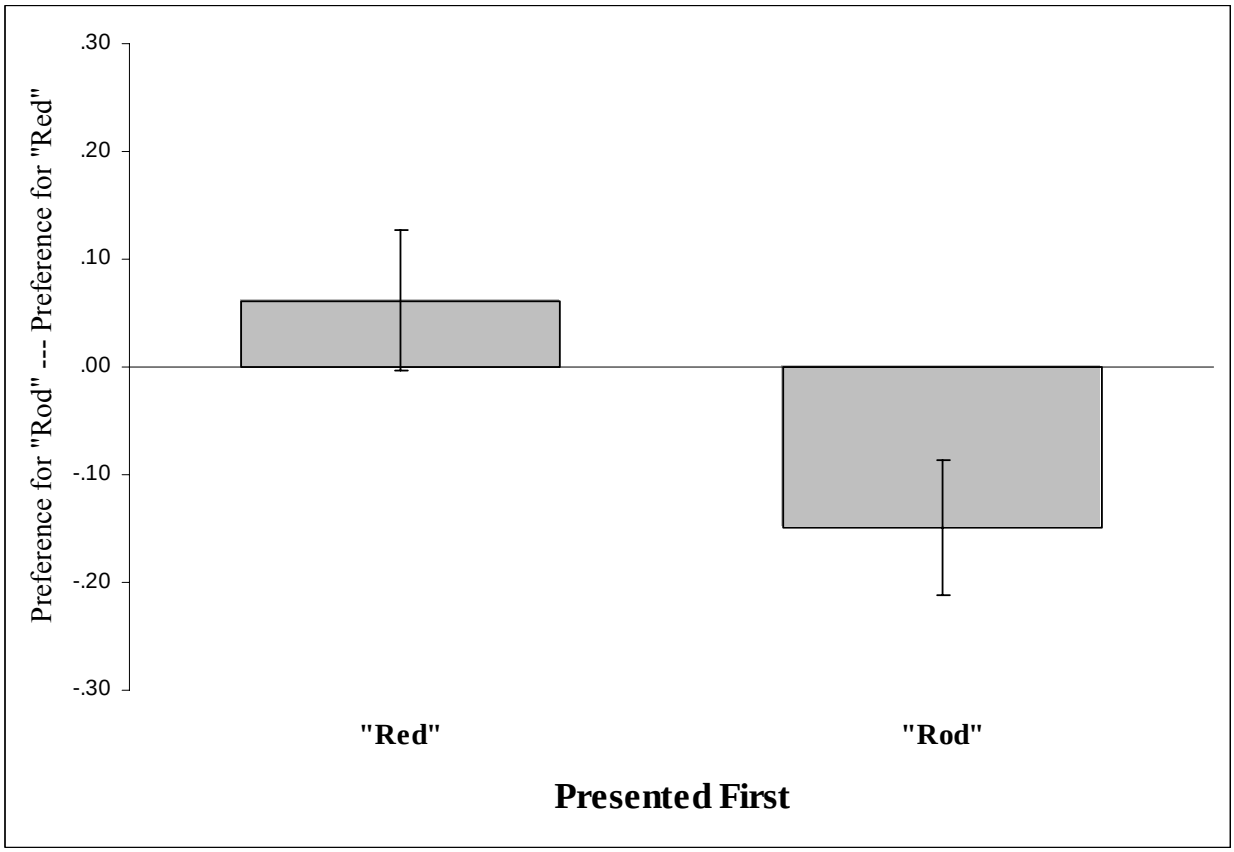

Figure 2. *The main effect of primacy on implicit preference for the average across teams (Hadleys vs. Rodsons), males (Jim vs. Jon), and females (Lisa vs. Lori). The implicit preference measure is a relative measure such that a score of zero indicates no preference. The bar on the left represents preference when Hadleys, Jim, or Lisa were presented first. Positive values indicate the average implicit preference for Hadleys, Jim, and Lisa. The bar on the right represents preference when Rodsons, Jon, or Lori were presented first. Negative values indicate the average implicit preference for Rodsons, Jon, and Lori. Error bars indicate standard error of the mean.*

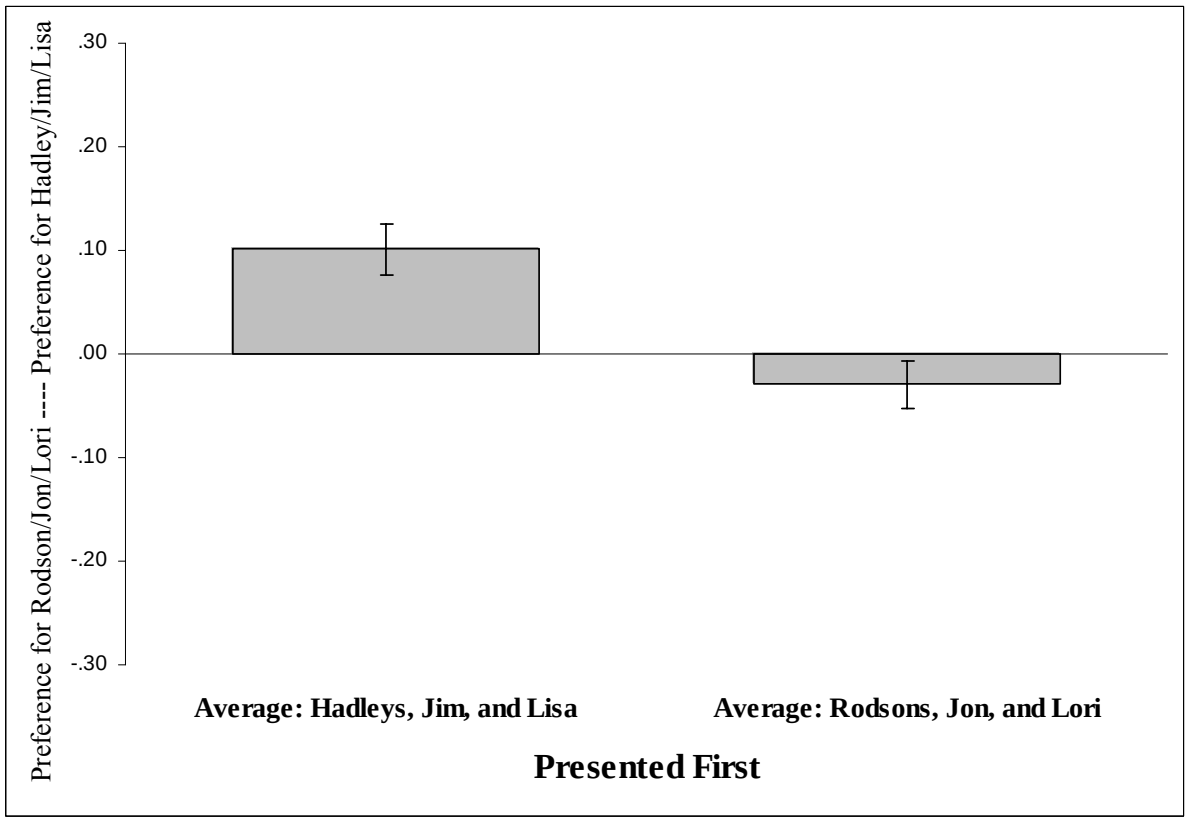

Figure 3. *The main effect of primacy on implicit preference for criminals (Jim vs. Jon). A score of zero indicates no preference. The bar on the left represents preference when Jim was presented first. Positive values indicate an implicit preference for Jim over Jon. The bar on the right represents preference when Jon was presented first. Negative values indicate a preference for Jon over Jim. Error bars indicate standard error of the mean.*