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**Nonverbal Communication of Similarity via the Torso: It's in the Bag**

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### **Abstract**

The human body plays a central role in nonverbal communication, conveying attitudes, personality, and values during social interactions. Three experiments in a large, open classroom setting investigated whether the visibility of torso-located cues affects nonverbal communication of similarity. In Expts. 1 and 2, half the participants wore a black plastic bag over their torso. Participants interacted with an unacquainted same-sex individual selected from a large class who was also wearing (or also not wearing) a bag. Expt. 3 added a clear bag condition, in which visual torso cues were not obscured. Across experiments, black bag-wearing participants selected partners who were less similar to them on attitudes, behaviors, and personality compared to the bag-less—and clear bag—participants. Nonverbal cues in the torso communicate information about similarity of attitudes, behavior, and personality; the center of the body plays a surprisingly central role in early-stage person perception and attraction.

*Keywords:* person perception, nonverbal cues, attitudes, similarity-attraction, first impression

### **Nonverbal Communication of Similarity via the Torso: It's in the Bag:**

People are remarkably adept at forming impressions of others based on a limited amount of information. From the very first moments of social interaction, before verbal exchange takes place, people use nonverbal cues (e.g., style of dress, makeup, movement, hairstyle, facial expression, posture, shoes) to make inferences about the attitudes, behaviors, and personality traits of others (Ambady, Bernieri, & Richeson, 2000; Gillath, Bahns, Ge, & Crandall, 2012). These evaluations are made spontaneously, often without intention or awareness of the perceiver (Uleman, Newman, & Moskowitz, 1996), and they contribute to an overall impression of similarity.

We extend the research on nonverbal cues to the core of the body, the human torso. The torso has been well-studied as a component of physical attractiveness evaluation (e.g., Graziano, Bruce, Sheese & Tobin, 2007), but what role does the torso play in communicating the attitudes and values of a person? We examine how blocking access to torso-located cues can disrupt social perception. In a set of three experiments, participants engaged in face-to-face social interactions with a fellow student in realistic settings. During these interactions, we obscured visual access to the torso to varying degrees, to see whether blocking torso-located cues affects impression formation and hampers people's ability to detect similarity. This, in turn, is likely to affect future interactions and friendship formation (Funder & Colvin, 1988; McArthur & Baron, 1983).

#### **What's in a Torso?**

The face, the body, and even hairstyles or shoes are all important nonverbal behavioral channels that convey personal information used by perceivers to form first impressions (Bereczkei & Mesko, 2006; Gillath et al., 2012). Most relevant to the current set of experiments are the many ways that body cues—and torso-located cues in particular—can communicate

social information to perceivers. The shape and motion of the waist, hips, and shoulders (areas included in the torso region) convey basic social percepts such as biological sex and gender typicality (Johnson & Tassinari, 2007; Pollick, Kay, Heim, & Stringer, 2005), as well as evaluative dimensions such as personality, happiness, and power (Koppensteiner & Grammer, 2010; Montepare & Zebrowitz-McArthur, 1988).

Perceivers can also accurately guess sexual orientation from gait (Johnson, Gill, Reichman, & Tassinari, 2007) and gestures (Ambady, Hallahan, & Conner, 1999) involving the torso. Dynamic postural cues such as an energetic versus tired stance, or a tense versus relaxed stance, are good indicators of personality traits (Naumann, Vazire, Rentfrow, & Gosling, 2009), and static postural cues such as forward or backward leaning are often used to make attributions of emotion (Coulson, 2004). However while most postural cues involve movement or body positioning in the torso region, they also involve body parts outside of the torso.

Clothing style, a cue that depends largely on visual access to the torso region, also contributes to judgments of personality traits. For example, stylish and neat clothing has been shown to indicate extraversion (Naumann et al., 2009), formal attire has been linked to conscientiousness (Borkenau & Liebler, 1992), and expensive or flashy clothing has been shown to reveal narcissism (Vazire, Naumann, Rentfrow, & Gosling, 2008). However, there is a notable absence of evidence that attitudes or behavioral preferences might also be perceptible from torso-located cues, a possibility we investigate in the experiments reported below.

Ample research attests to the fact that judgments of physical attractiveness, and by extension social choices, are influenced by body cues in the torso region (Crandall, 1994; Johnson & Tassinari, 2007). We propose that social choices are also based in part on the inferences that can be made about the target's attitudes, personality, and behavioral preferences,

from nonverbal cues in the torso. We seek to integrate research on torso-located cues with the existing literature on how configural physical qualities are informative for social judgments (Zebrowitz & Collins, 1997). We hope to discover whether the kind of social information carried by torso-located cues extends beyond physical attractiveness or gender typicality to include attitudes, values, personality, and behavioral preferences. We expect that obscuring the torso will affect social judgment and choice, in part because it interferes with the process of impression formation and the ability to form an overall judgment of similarity.

### **Snap Judgments of Similarity**

Similarity leads to attraction (Byrne, 1971), and increases interest in friendship and other relationships. The similarity-attraction connection has been studied extensively, but most of the experimental research has relied on providing participants with similarity information that is clear, written, and easily accessible (Montoya, Horton, & Kirchner, 2008). This plain and palpable information is useful theoretically, but it hardly maps on to the common real-world situation, where people meet *in vivo*, without access to questionnaires, ratings, or explicit statements of belief. Instead, people rely more on the nonverbal (and verbal) cues available to them at first acquaintance. How is similarity detected under these more typical conditions?

Asch (1946) argued that the ability to form individuated impressions of people is a critical human skill. Keen person perception abilities are adaptive in helping people to detect physical threats as well as social opportunities (Haselton & Funder, 2006; Stillman, Maner, & Baumeister, 2010; Vazire, 2010). Being able to skillfully evaluate nonverbal social cues can lead to improved mental health and social adjustment (Hall, Andrzejewski, & Yopchick, 2009), whereas failure to evaluate and process social cues can have detrimental consequences (Hartup, 1989). The capacity to discern, quickly and effortlessly, which potential relationship partners are

well-matched to one's own characteristics has clear advantages (Zebrowitz & Collins, 1997); most notably it allows people to avoid the social costs of pursuing relationships that are unlikely to form or persist.

### **Recognizing Opportunities for Friendly Interaction**

The ecological approach to social perception (MacArthur & Baron, 1983; Zebrowitz & Collins, 1997) is a useful tool for conceptualizing how similarity can be communicated at first impression through nonverbal cues. The ecological approach focuses on the adaptive function of social perception, following the Gibsonian adage "perceiving is for doing." Gibson (1979) argued that stimulus information in the external world guides biologically or socially adaptive behaviors; at the same time, social perception is guided by the perceiver's goals.

In the context of our research, we focus on the goal of recognizing opportunities for friendly interaction. We constructed a social situation in which the perceiver's goal was to find a friendly, easy interaction partner for a discussion. This should have led people to perceive and value affordances that point to fluid, pleasant interaction—a goal common to the initiation of many different kinds of relationships. One way to satisfy this goal is by seeking *similar* others (e.g., Byrne, 1971; Berscheid & Walster, 1969; Crandall, Schiffhauer, & Harvey, 1997). We suggest that in order to identify well-matched (i.e., similar) interaction partners even before verbal exchange takes place, people must be able to recognize similarity very early in the process. Because nonverbal cues are often available immediately (and verbal cues are often not, Ambady et al., 2000), the process of person perception is likely to be faster and more efficient when it is facilitated by nonverbal cues.

Another tenet of the ecological approach is that social perception in naturalistic settings relies on a conglomeration of dynamic, multimodal stimulus information. Cues can signal

individual traits or attributes as well as other social affordances (“opportunities for acting, interacting, or being acted upon that others provide,” Zebrowitz & Collins, 1997, p. 217), such as opportunities for friendship formation. When multiple cues are available and point to the same inference, accurate perception is facilitated (Walker-Andrews, 2008). We propose that impressions of similarity (or dissimilarity) are formed using any and all available information, and are not dependent on any one particular cue or set of cues.

Most previous research on person perception has looked at perception of individual characteristics of the target person. Yet some of the cues that aid perception of the affordance of friendship—such as an overall impression of similarity—are not inherent to the target person, but are emergent properties of dyadic interaction. DePaulo, Kenny, Hoover, Webb, and Oliver (1987) point out that sensitivity to how one is perceived by specific others helps people to distinguish friends from enemies, which can be “useful to people deciding which particular relationships to pursue” (p. 304). Such information can only be gleaned from the dynamic cues that emerge out of face-to-face social interaction, with its richness of gestural, postural, appearance, clothing, and other nonverbal cues.

### **Overview of Experiments**

We focused our study of the nonverbal communication of similarity on the question of whether the availability of nonverbal cues in the torso affects social choices. Because people like to be with similar others when possible (Zeggelink, 1995), we predicted that similarity should guide social choices *as long as it can be detected*. In a set of three experiments conducted during three separate semesters, we tested whether obscuring nonverbal cues inferred from the torso interferes with similarity-based assortment in a first impression situation.

Participants in a large classroom setting wore either a black, opaque plastic bag, a clear plastic bag, or no bag, and were asked to select a same-sex person they had never before met and engage in a two-minute conversation. This manipulation allowed us to test how the limiting of nonverbal cues affects social choice in an ecologically valid setting, with a task closely related to the earliest stages of friendship formation. Because the selection of an interaction partner occurred before verbal interaction began, the choice of interaction partner was based almost entirely on nonverbal cues and what one could infer of the characteristics of potential partners. We expected the availability of nonverbal cues to affect the choice of whom to meet (a pre-interaction measure of attraction based solely on nonverbal information), but we did *not* expect the bag manipulation to affect the post-interaction evaluation of the partner, which is based on more than just the availability of nonverbal cues (i.e., it is based on the interaction itself, including verbal cues, content of conversation, responsiveness, etc.). We predicted that interaction partners would be more similar to each other when the torso was visible as compared to when the torso was hidden.

### **Experiment 1**

If the bag interferes with the process of evaluating similarity via nonverbal cues, interaction partners should be less similar to each other in the black bag compared to the no bag condition. That said, the level of similarity among interaction partners in a first impression situation is likely to be present but not high, due to the short time and relatively low risk nature of the task. Without a priori knowledge of which attitudes or behaviors serve as the basis for similarity evaluations, we measured a variety of different attitudes, behaviors and personality traits with the expectation that pair similarity in this context might be low but still predictive of

the social choice of whom to meet. We then compared how similar interaction partners were on these dimensions across bag conditions.

## Method

### Participants

Participants were 234 undergraduates ( $N = 113$  women<sup>1</sup>) in a large introductory psychology class from the University of Kansas. Participants ranged in age from 18-55 years ( $Mdn = 19$ ,  $SD = 3.13$ ). The study was conducted as part of an in-class activity near the end of the semester and students received attendance credit for their presence in class that day (as far as could be ascertained, all students present participated in the experiment). We described the activity as a “social get-together where you will have the chance to meet and talk with your classmates” that would also involve the completion of some questionnaires.

As is true for all three experiments, this research was approved by the institutional review board at the University of Kansas and precautions were taken to ensure the ethical treatment of participants and proper handling of the data. Informed consent was obtained on the day of the in-class activity by posting an information statement describing the goals of the study, the nature of the in-class exercise, and consideration of potential risks and benefits. A separate consent form was used for the online measures, administered near the beginning of the semester.

### Materials and Procedure

We randomly assigned half of the sample to wear an opaque, black plastic bag (76.2 x 91.4 centimeters, .02 millimeters thick) over their torso area, leaving arms, legs, head and neck

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<sup>1</sup> In all three experiments we tested for gender effects. There was no reliable pattern across the studies.

visible. Participants were instructed to initiate a brief interaction with a same-sex, same-bag-condition person with whom they had never before spoken, from a different section of the large lecture hall classroom (we divided the class into quadrants and asked participants to interact with someone from the diagonally opposite quadrant). Participants were instructed to converse for two minutes about an assigned mundane topic (favorite vegetables, whether or not Pluto is a planet, number of credits required for the major). Both participants were either wearing a bag (*bag condition*,  $N = 116$  or 58 pairs) or not wearing a bag (*no bag condition*,  $N = 118$  or 59 pairs).

**Evaluation of the partner.** After the interaction, pairs separated and each participant privately reported their attraction to their interaction partner and the partner's appeal as a potential friend by responding to three items using a paper and pencil questionnaire ( $\alpha = .85$ ): "I had a good feeling about this person before we interacted (1 = *Strongly disagree*, 7 = *Strongly agree*)," "I would be interested in becoming friends with this person (1 = *Not at all interested*, 7 = *Very interested*)," "I like this person (1 = *Not at all*, 7 = *Very much*)." Participants also answered, "How similar do you believe this person is to you? (1 = *Not at all*, 7 = *Very much*)."

**Profile of similarity.** We measured a variety of attitudes, personality traits, and behaviors (28 dimensions<sup>2</sup> total) in order to assess the overall profile of similarity of the interaction partners. Participants completed three attitude items immediately before the interaction including "My overall attitude toward exercising is" "My overall attitude toward gays is" (1 = *Unfavorable*, 5 = *Favorable*), and "The average person can live a good enough life

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<sup>2</sup> We assessed 15 attitudes and 8 behaviors with single items, and 5 personality dimensions with two items each.

without religion” (1 = *Disagree*, 5 = *Agree*). Participants completed the remaining measures online, before the day of the in-class activity.<sup>3</sup> We measured political beliefs (1 = *Conservative*, 4 = *Moderate*, 7 = *Liberal*), abortion attitudes with the item “Abortion should be legal in all situations” (1 = *Disagree*, 5 = *Agree*), and prejudice toward 10 social groups (Arabs, Asian Americans, Black Americans, fat people, female prostitutes, homeless people, interracial couples, Jews, Latinos, and Native Americans ) with single-item feeling thermometers (1 = *Very negative*, 7 = *Very positive*). We measured the Big Five personality dimensions using the Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). And we measured eight behaviors including frequency of going to the gym (both alone and with others), going to class, going out drinking, playing an instrument, doing artwork, eating meat, and going to church (0 = *Never*, 5 = *A lot*). Participants also completed demographic information (age, gender).

## **Results and Discussion**

### **The Effect of Bag Wearing on Social Choices**

To examine whether participants tended to select people who are similar to them for interaction, we first restructured the data so that attitudes, personality, and behaviors were nested within pairs. For each pair there were 28 observations on Person 1 and 28 corresponding observations on Person 2. Observations were standardized within person. Structuring the data in this repeated measures way allowed us to consider the profile of similarity for each pair across the entire set of variables we measured (Klohn & Mendelsohn, 1998).

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<sup>3</sup> In the no bag condition, intraclass correlations (a measure of pair similarity) were not significantly different for variables measured during the in-class activity or measured online. This was true in all three experiments.

We then used multilevel modeling (MLM) to regress Person 1's characteristics on Person 2's characteristics, a dummy coded variable for bag condition (0 = no bag, 1 = bag), and the interaction term. If obscuring the torso interferes with similarity detection, we would expect bag condition to moderate the degree of pair similarity as evidenced by the interaction term. Similarity is conceptualized in this analysis as the slope of the line between Person 1 and Person 2, with greater positive slopes indicating greater similarity. Slopes were allowed to vary randomly across dyads. Because the variables were standardized within person, the expected value for the profile of pair similarity (i.e., the slope) is zero. Standardizing also accounts for the fact that the two members of the dyad are indistinguishable; the slope of the line representing pair similarity is estimated as a correlation since the variance has been rescaled to 1.0 (i.e., regressing Y on X or X on Y yields the same result).

As shown in Figure 1, the MLM analysis revealed a significant positive slope of the line estimating pair similarity in the no bag condition ( $b = .15$ ,  $SE = .04$ ,  $t(110) = 4.21$ ,  $p < .0005$ , 95% CI [.08, .22]), indicating that pairs were more similar than could be expected by chance. With the torso-covering bags on, however, the slope was not significant ( $b = .05$ ,  $SE = .04$ ,  $t(110) = 1.25$ ,  $p = .21$ , 95% CI [-.03, .12]), indicating that pairs in the bag condition were no more similar than could be expected by chance. The interaction term was significant ( $b = -.11$ ,  $SE = .05$ ,  $t(110) = -2.06$ ,  $p = .04$ , 95% CI [-.21, -.004]); similarity within pairs was reliably found among the bag-less pairs but not among the bag-wearing pairs. Wearing a bag appears to have interfered with impression formation, as the social choice of whom to meet in a get-acquainted setting was related to similarity when torsos were visible (in the no bag condition) but not when torsos were obscured (in the bag condition).

Similarity is an emergent property of the pair; thus it is impossible to know a priori which dimensions of similarity will be important to each unique pair. It is extremely likely that pairs in our experiment shared meaningful similarity or dissimilarity on dimensions that our measures did not capture. Nevertheless, by casting a wide net and measuring similarity across a variety of attitudinal, personality, and behavioral measures, we were able to detect differences in the overall similarity profile of pairs in the bag condition compared to pairs in the no bag condition.

### **The Effect of Bag Wearing on Evaluation of the Partner**

Wearing a bag interfered with similarity-based assortment but it did not affect post-interaction ratings of attraction (see Table 1, columns on left),  $t < 1$ . This is consistent with our expectation that the availability of nonverbal cues only affects pre-interaction social choices (i.e., the decision of whom to meet) that are based solely on nonverbal information; post-interaction evaluations of the partner are shaped substantially by the nature of the social interaction itself (including verbal cues). Obscuring the nonverbal cues that aid early-stage person perception led participants to form matches that did not share the underlying similarity that the bag-less participants shared. Yet bag-wearing participants did not translate this low similarity into reduced interest in friendship, at least when attraction was measured immediately following the brief interaction. Perhaps with extended interaction bag-wearing pairs would discover their dissimilarity and show less interest in friendship. Other studies from our lab using similar methodology suggest this is likely, as similarity of attitudes, personality and behaviors predicted continued social interaction among newly acquainted pairs in a classroom setting (Authors, 2015).

Although there was a difference in actual similarity across bag conditions on the dimensions we measured, there was no difference in perceived similarity (see Table 1),  $t < 1$ .

This suggests that post-interaction attraction ratings may have been based on perceived similarity and information gleaned from the conversation itself rather than the dimensions of similarity included in our measures. Our data seem to be consistent with this explanation; perceived similarity was correlated with attraction ( $r = .59, p < .0005$ ).

Obscuring nonverbal cues in the torso area interfered with participants' ability to select similar others. A possible alternative explanation for our findings is that the awkwardness and discomfort associated with wearing a plastic bag was distracting and interfered with social choices. In Experiment 2 we attempted to rule out this explanation by measuring mood and discomfort as a function of bag condition.

### **Experiment 2**

Experiment 1 found that limiting accessibility to the torso using a black plastic bag reduced assortment into similar pairs. In Experiment 2 we sought to replicate our findings and to rule out the "awkwardness" explanation by measuring participants' general mood and discomfort during the "get acquainted" activity. If wearing a bag (an unusual behavior for everyday social interactions) leads to awkwardness, we should find an increase in reported discomfort and negative mood in the bag condition compared to the no bag condition. If the reduced assortment we observed in the bag condition is due to an attentional or motivational disruption generated by the awkwardness of wearing a bag, then we should expect that differences in similarity by bag condition are accounted for by the increased discomfort. If, however, low similarity is due to the limited availability of diagnostic cues in the torso area, we should expect that bag-wearing pairs are less similar than bag-less pairs even after controlling for discomfort.

### **Method**

#### **Participants**

Participants were 316 undergraduates ( $N = 182$  women) in a large introductory psychology class at the University of Kansas. Participants ranged in age from 18-28 years ( $Mdn = 19$ ,  $SD = 1.20$ ). The study was conducted as part of an in-class activity near the end of the semester and students received attendance credit for their presence in class that day (as far as could be ascertained, all students present participated in the experiment).

### **Materials and Procedure**

The procedure for Experiment 2 was exactly the same as for Experiment 1 except that we used a reduced set of items to measure pair similarity and we added measures of general mood and discomfort during the activity. Participants were randomly assigned to wear a black, opaque plastic bag (*bag condition*,  $N = 144$  or 72 pairs) or not (*no bag condition*,  $N = 172$  or 86 pairs).

**Mood and discomfort.** Just before the interaction—but while wearing the bags (or not)—participants reported their general mood (1 = *Unpleasant*, 5 = *Pleasant*). At the end of the activity participants responded to the items “This exercise made me feel uncomfortable,” “The interaction I had during this activity was strange,” and “This was an enjoyable way to spend class time,” (1 = *Strongly disagree*, 7 = *Strongly agree*).

**Evaluation of the partner.** After the interaction, participants completed the same measures of attraction ( $\alpha = .86$ ) and perceived similarity as in Experiment 1 and also rated their partner on perceived friendliness with the item and “How friendly and outgoing would you say this person is? (1 = *Not at all*, 7 = *Very much*).”

**Profile of similarity.** A subset of 18 of the dimensions used in Experiment 1 to measure attitude, personality, and behavior similarity was used in Experiment 2. The only dimensions that were not repeated were the 10 prejudices. Attitudes toward gay men, religion, and abortion and

frequency of drinking alcohol were assessed immediately before the interaction. The remaining dimensions were assessed online (before the day of the in-class activity).

## Results and Discussion

### The Effect of Bag Wearing on Social Choices

Following the same analysis strategy as in Experiment 1, we used MLM to regress Person 1's characteristics on Person 2's characteristics (using the 18 dimensions we measured in Experiment 2), a dummy coded variable for bag condition (0 = no bag, 1 = bag), and the interaction term, this time controlling for discomfort in the model. Slopes were allowed to vary randomly across dyads.

The results of this analysis are shown in Figure 2. There was a significant positive slope of the line estimating pair similarity in the no bag condition ( $b = .07$ ,  $SE = .03$ ,  $t(132) = 2.16$ ,  $p = .03$ , 95% CI [.01, .14]), indicating that the pairs were more similar than could be expected by chance. With the torso-covering bags on, however, the slope was not significant (and slightly negative,  $b = -.03$ ,  $SE = .04$ ,  $t(132) = 0.86$ ,  $p = .39$ , 95% CI [-.10, .04]), indicating that pairs in the bag condition were no more similar than could be expected by chance. The interaction term was significant ( $b = -.10$ ,  $SE = .05$ ,  $t(132) = -2.11$ ,  $p = .04$ , 95% CI [-.20, -.01]); similarity within pairs was reliably found when the torso was visible but not when the torso was hidden. Obscuring the torso area by covering it with an opaque, black plastic bag again erased assortment into similar pairs.

### The Effect of Bag Wearing on Evaluation of the Partner

As in Experiment 1, bag condition had no effect on post-interaction ratings of attraction, perceived similarity, or friendliness of the interaction partner (see Table 1, middle columns;  $t_s < 1$ ). Bag-wearing pairs were less similar than bag-less pairs, yet immediately following the brief

interaction these low similarity pairs were no less interested in pursuing friendship. These findings are consistent with our suggestion that the basis of post-interaction attraction is most likely perceived similarity (which may be influenced by the interaction itself) rather than actual similarity on the dimensions we measured.

### **The Effect of Bag Wearing on Mood and Discomfort**

We compared participants wearing a bag to participants not wearing a bag on the mood and discomfort measures added in Experiment 2. As shown in Table 1, wearing a bag had no effect on mood, enjoyment of the activity, discomfort or perceived strangeness of the interactions, all  $t$ s < 1.6, all  $p$ s > .10. The closest finding to significance was that participants wearing a bag felt somewhat more uncomfortable than participants who were not wearing a bag, however the difference was not statistically significant  $t(309) = 1.59, p = .11, d = .18$ .

A test of the indirect effect of bag condition on similarity (measured as the discrepancy between Person 1 and Person 2 on each attitude, behavior, or personality trait) through discomfort was not significant (Preacher & Hayes, 2004; 95% CI [-.04, .01]). This failed test of mediation allows us to discount the possibility that the effect of the bag on pair similarity can be explained by reported discomfort associated with wearing a bag.

Two separate experiments revealed the same basic effect—limiting visual access to the torso reduced assortment into similar pairs. The consistency of our results attests to the robustness of the finding, but it also suggests that attraction in the earliest stages of acquaintance (before verbal interaction) is influenced by an overall impression of similarity. This aspect of impression formation seems to be hindered when torso-related cues are blocked.

### **Experiment 3**

Experiments 1 and 2 found that limiting access to the torso using a black plastic bag reduced assortment into similar pairs. The results were not explained by differences in mood or discomfort associated with wearing a bag, but these data are based entirely on self-reports, and participants may have been unaware of, or unwilling to admit their discomfort, or the bag's opacity may have had other, unmeasured effects. In Experiment 3 we therefore added a clear (transparent) plastic bag condition. Clear bags and black bags should generate the same amount of discomfort and they are both unusual items to wear. But clear bags do not obscure nonverbal cues to the same degree as the black, opaque bags. If black bags—but not clear bags—interfere with finding a similar interaction partner, “awkwardness” would become an unlikely explanation for our effects. If the torso carries information used in early-stage person perception, as we hypothesize, then pairs wearing black bags should be less similar than pairs wearing clear bags or pairs without bags.

## Method

### Participants

Participants were 306 undergraduates ( $N = 128$  women) in a large introductory psychology class at the University of Kansas. Participants ranged in age from 18-31 years ( $Mdn = 19$ ,  $SD = 1.82$ ). The study was conducted as part of an in-class activity near the end of the semester and students received attendance credit for their presence in class that day (as far as could be ascertained, all students present participated in the experiment).

### Materials and Procedure

The procedure for Experiment 3 was exactly the same as for Experiments 1 and 2 except that we added a clear bag condition. Participants were randomly assigned to one of three conditions: no bag ( $N = 94$  or 47 pairs), clear bag ( $N = 102$  or 51 pairs) or black bag ( $N = 110$  or

55 pairs).<sup>4</sup> Clear bags were about the same size as the black bags (96.5 x 91.4 centimeters, .02 millimeters thick). Some of the measures were completed in-class on the day of the experiment and some measures were completed online before the day of the in-class activity.

**Mood and discomfort.** Just before the interaction—but while wearing the bags (or not)—participants reported their general mood (1 = *Unpleasant*, 5 = *Pleasant*). After the interaction, participants rated their discomfort with the same three items as used in Experiment 2. Participants also responded to the items “The bag made me feel uncomfortable,” and “I felt like I could be myself in this exercise” (1 = *Strongly disagree*, 7 = *Strongly agree*).

**Evaluation of the partner.** After the interaction, participants completed the same measures of attraction ( $\alpha = .79$ ), perceived similarity, and friendliness as used in Experiments 1 and 2. In the week following the in-class activity, participants responded online to the item “Which of the following factors was the most influential in who you decided to meet for the in-class activity?” The response options were “*They seemed similar to me*,” “*They seemed friendly*,” “*They made me feel comfortable*,” “*They seemed interesting*,” “*I have no idea*,” or “*Something else*” (with a free response field).

**Profile of similarity.** The same set of 18 dimensions used in Experiment 2 was used to assess similarity of attitudes, personality, and behaviors.

## Results and Discussion

### The Effect of Bag Wearing on Social Choices

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<sup>4</sup> We slightly over-assigned participants to the black bag condition to increase the power to detect a difference between the black bag condition and the two control conditions (clear bag and no bag). We randomly assigned 40% of the sample to the black bag condition, 30% to the clear bag condition, and 30% to the no bag condition.

Our main hypothesis was that black bags interfere with finding a similar partner because torsos carry meaningful information about what someone is like. If this were true we would expect that pairs would be similar when torsos are visible (in the no bag and clear bag conditions), but not similar when torsos are hidden (in the black bag condition). The alternative hypothesis is that wearing a bag interferes with finding a similar partner because the presence of the bag changes the nature of the social interaction. In this scenario we would expect that pairs would be similar in the no bag condition only, and not similar in either bag condition (black or clear).

To evaluate these two possibilities we compared the slope of the line estimating pair similarity in each of the three bag conditions using the same MLM analysis strategy as in Experiments 1 and 2, and tested to see whether the slope was significantly different from zero (the value expected by chance). The results are plainly visible in Figure 3, where the slopes estimating similarity are displayed. The slope was positive and significant in the no bag condition ( $b = .14$ ,  $SE = .05$ ,  $t(132) = 2.80$ ,  $p = .01$ , 95% CI [.04, .23]), indicating we replicated the finding that bag-less participants assorted based on similarity. By contrast, the slope was shallow and not significant in the black bag condition ( $b = .04$ ,  $SE = .04$ ,  $t(132) = 1.03$ ,  $p = .31$ , 95% CI[-.04, .13]), indicating that hiding the torso with a black bag once again eliminated similarity within pairs.<sup>5</sup>

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<sup>5</sup> The interaction term comparing the black bag condition to the no bag condition was  $b = -.09$ ,  $SE = .07$ ,  $t(129) = -1.41$ ,  $p = .16$ , 95% CI = -.22 to .04. Despite our efforts to maximize power by slightly over-assigning participants to the black bag condition, the statistical tests of the two contrasts (comparing the black bag and the clear bag conditions to the no bag condition) have less power compared to the statistical tests reported in Experiments 1 and 2. Sample size was constrained by the number of students attending class on the day of the activity, and dividing the class into three rather than two conditions necessarily reduced power.

In the critical test of the “torsos have information hypothesis” we found that the clear bag condition was like the no bag condition; the slope was positive and significant ( $b = .11$ ,  $SE = .04$ ,  $t(132) = 2.51$ ,  $p = .01$ , 95% CI [.02, .20]); participants wearing clear bags succeeded in finding a similar person to talk to.<sup>6</sup> These results are consistent with the “torsos have information” hypothesis, and inconsistent with the “bags interfere” hypothesis. As in Experiments 1 and 2, limiting the accessibility of the torso area by covering it with a black bag—but not a clear bag—interfered with people’s ability to evaluate similarity and choose a similar partner for social interaction. These results further support the proposition that it is the limited availability of nonverbal cues, rather than the discomfort or disruption associated with wearing a bag, that interfered with assortment by similarity.

### **The Effect of Bag Wearing on Mood and Discomfort**

We compared participants in the black bag, clear bag, and no bag conditions on the mood and discomfort measures. As shown in Table 1 (columns on right), bag condition had no effect on mood, discomfort, or participants’ ability to be themselves in the exercise, all  $F_s < 1$ . Participants wearing a bag (whether clear or black) reported that the bag made them feel more uncomfortable than participants who were not wearing a bag,  $F(2, 292) = 20.13$ ,  $p < .0005$ . However, the mean rating was below the midpoint of the scale in all three conditions, and there was no significant difference in how uncomfortable the black bags and the clear bags made participants feel (contrast  $p = .24$ ). These results indicate that the clear bag manipulation is equally matched to the black bag manipulation in terms of discomfort associated with wearing a

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<sup>6</sup> The interaction term comparing the clear bag condition to the no bag condition was  $b = -.03$ ,  $SE = .07$ ,  $t(129) = -0.40$ ,  $p = .69$ , 95% CI =  $-.16$  to  $.10$ . This confirms that the degree of similarity within pairs in the clear bag condition was not significantly different from the no bag condition.

bag, making the availability of nonverbal cues in the torso area the main difference between the conditions.

### **The Effect of Bag Wearing on Evaluation of the Partner**

Once again bag condition had no effect on post-interaction attraction, perceived similarity, or friendliness of the interaction partner,  $F_s < 1.8$ ,  $ps > .17$  (see Table 1, columns on right); the presence of a bag alone did not fundamentally change the nature of the social interaction. Participants were no less interested in pursuing friendship in the black bag condition even though the interaction partner they had selected was less similar to them in attitudes, behavior, and personality. This suggests the basis for ratings of attraction was not based on independently measured similarity.

When similarity detection is impeded by the limited availability of nonverbal cues, ratings of attraction must be based on something else. Attraction may be based on perceived similarity, friendliness, positive mood, physical attractiveness, positivity of the social interaction, or any combination of these factors. Our data suggest that several of these factors, such as perceived similarity ( $r = .63$ ), friendliness ( $r = .59$ ), and positive mood ( $r = .27$ ), all  $ps < .0005$ , are related to attraction.

Bags interfered with similarity detection but participants did not show awareness of the reduced similarity, basing their ratings of attraction on factors other than independently measured similarity. When asked what factor was most influential in who they chose to meet, only a small number of participants listed similarity (8.8%). The most common response was “they seemed friendly” (44.2%), followed by “something else” (20.4%), “I don’t know” (16.6%), “they seemed interesting” (6.6%), and “they made me feel comfortable” (3.3%). The reasons participants gave for why they selected their interaction partner did not vary by bag condition.

We concluded that the bag manipulation had its effect very early in the friendship formation process, and participants were probably not aware that overall impressions of similarity were guiding their choices. The availability of torso-located cues affected selection of the interaction partner, but once verbal interaction took place the bag seems not to have influenced the interaction itself or subsequent ratings of attraction.

### **General Discussion**

Many participants found someone to talk to who was similar to them when torsos were visible; however hiding the torso with a black bag erased the assortment by similarity. These results were quite stable across experiments. “Unobstructed” pairs were more similar than would be expected by chance alone. By contrast, pairs wearing black bags were no more similar than chance; wearing a black bag over the torso area eliminated assortment by attitudinal, behavioral, and personality similarity.

People are surprisingly fast and integrative in the judgments they make of others based on limited visual data. In this respect our findings are consistent with the broader literature on person perception and first impressions (e.g., Ambady et al., 2000). Yet an important contribution of the current research is in identifying a notable exception to the ease and utility of these judgments: when information from the torso is removed, in vivo, functionality in social perception is substantially degraded.

Similarity is a reliable predictor of attraction, but only when the relevant information that informs similarity judgments can be detected. In our experiments, the selection of an interaction partner is a behavioral measure of attraction. Obscuring torso-related cues impaired similarity detection, and as a result the choice of whom to meet was no longer based on “objective” similarity.

Perceived similarity was correlated with post-interaction attraction, but neither was affected by the bag manipulation. This suggests that the presence of the bag primarily affected the availability of nonverbal cues, rather than shaping the nature of the social interaction itself. Post-interaction ratings of attraction seem based on perceived similarity; people may falsely assume others are similar to them due to egocentrism (Gray, 2008), false consensus bias (Ross, Greene, & House, 1977), or projection (Morry, 2005)—none of which should have been affected by the bag manipulation. Post-interaction attraction may also have been based on other factors such as perceived friendliness, positive mood, physical attraction, or the overall positivity of the social interaction.

### **What's in a Torso?**

People use nonverbal cues to perceive similarity, and perceived similarity affects friendship selection (Hoyle, 1993). While there is not yet an exhaustive review of all the cues people use, our experiments show that cues located in the torso area contribute in an important way to social perception. The cues people use for this task are not redundant with face, hairstyle, gait, paralinguistic cues, or expressive movement of the arms, legs, neck or head—none of which were substantially disturbed by the manipulation. It is open to debate exactly what information in the torso the bag concealed. Whatever these cues are (body size, subtle movement, waist-to-hip ratio, or even the presence of plaid), they convey information regarding the attitudes, behaviors and personality of others, and without this information people's ability to recognize similarity in others was stifled. Pinning down exactly which cues perceivers use for judgments of specific attitudes, behavior, or personality traits remains an open question for further research.

Most of the work on torso perception in psychology to date has been relevant to sexual attractiveness and primarily uses female targets (e.g., Horvath, 1981; Singh, 1993), or is part of

research on height (e.g., Graziano, Brothen & Berscheid, 1978). Our findings suggest that there is more to this region of the body than sexual signals—the torso reveals to some significant extent one’s social tolerances and prejudices.

Effective nonverbal communication requires both the successful encoding of social information by the target of judgment and the successful decoding of social information by the perceiver (Levy, 1964). Interfering with either of these complementary processes may result in reduced ability to communicate similarity-related information. Although we cannot directly test whether the reduced assortment we observed in our experiments resulted from errors of encoding or decoding, we speculate that since wearing a bag alters the availability of cues from the target of judgment, our effects most likely reflect a failure of encoding. In other words the diagnostic information simply was not available to perceivers; it seems unlikely that our effects were due to participants wearing bags being unskilled decoders.

A possible alternative explanation for our effects is that the bag created a new social group identity (e.g., Tajfel, Billig, Bundy, & Flament, 1971). People in our studies assorted into similar pairs, however the assortment among those who wore bags was based solely on their category (bag wearers) as opposed to other personal characteristics. This explanation seems unlikely, however, because we might expect to see a similar effect in the clear bag condition. The black and clear bags should have about the same effect on group identity under this hypothesis, and therefore the similarity effects should be about the same for these two groups; they were not.

Our method has some distinct advantages as well as some limitations. Perhaps its most notable strength is the naturalistic setting. It is natural experimental situations like these that are likely to be most informative as to how people meet each other, form evaluations, decide to

interact, and eventually form relationships. The manipulation of wearing a bag served the purpose of limiting visual access to the torso and was simple to implement in the classroom setting, but also conflated the effects of specific nonverbal cues in the torso region. There is still much to be learned about which torso cues provide information about which dimensions of similarity.

Because the in-class activity took place near the end of the semester, it is possible that mere exposure influenced students' social choices (Moreland & Beach, 1992). However, wearing a bag did not affect ratings of attraction or perceived similarity, so it seems that any effect of exposure was operating equally across conditions. The large class size (with an enrollment of 500 students) and our instructions to move to a different quadrant of the lecture hall to find a partner for the activity, also make it less likely that incidental previous contact influenced our results.

### **Models of Impression Formation**

Seeing the torso region was informative—without it, participants did not find a similar person for interaction. These in vivo, uncontrolled, messy-but-realistic interactions reveal the importance of a heretofore unrecognized critical feature for person perception—visual access to another's midsection. This is not generally recognized in the literature as important, and we suspect that the importance of the torso extends beyond the role it plays in sexual attraction (Hovarth, 1981; Singh, 1993). The torso is literally a core part of the complete person, and when this piece of information is unavailable, the whole process of impression formation is hobbled.

An ecological perspective views social perception as the process of extracting meaning from the structure of dynamic stimulus information; impression formation is a data-driven, bottom-up process (Berry & Finch Wero, 1993). By contrast, cognitive approaches tend to view

social perception as an inferential, top-down process. Stereotype models that focus on the active processing of available information are consistent with an ecological approach in many respects (e.g., Brewer, 1988; Fiske & Neuberg, 1990). For example, the ecological approach predicts that perceivers will be attuned to adaptively relevant information, such as recognizing opportunities for friendship or friendly interaction where they exist. The particular cues perceivers attend to in order to form an overall impression of similarity, however, are likely to vary by situation and by perceiver.

### **Conclusion**

Person perception happens very quickly. It takes no more than a few moments to judge whether a person is attractive or not (van Hooff, Crawford, & van Vugt, 2010) and only a few minutes to know whether one would like to see a person again (Eastwick & Finkel, 2008). These earliest reactions can have long-lasting outcomes. One among the handful of important criteria to influence these decisions is attitudinal, behavioral, and personality similarity.

Homophily—love of the same—is a fundamental principle of biology; assortative mating is prevalent among all kinds of species including angioplants, fruit flies, birds, and humans (Bearhop et al., 2005; Krueger, Moffitt, Caspi, Bleske, & Silva, 1998; Sharon, Segal, Ringo, Hefetz, Zilber-Rosenberg, & Rosenberg, 2010; Watson, Klohnen, Casillas, Simms, Haig, & Berry, 2004). Friendship, romantic relationships, and group membership are all characterized by similarity on dimensions that are important to the group. The torso area of the human body plays a surprisingly important role in the earliest stages of this kind of social judgment. With torso information obscured, participants were almost complete failures at detecting and acting upon similarity. When the torso is obscured from view, the odds of finding an easy, similar person for social interaction are not in the bag.

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Table 1

*Mean Partner and Activity Ratings by Bag Condition (SD in Parentheses)*

Variable	Experiment 1		Experiment 2		Experiment 3		
	Black Bag (N = 116)	No Bag (N = 118)	Black Bag (N = 144)	No Bag (N = 172)	Black Bag (N = 110)	Clear Bag (N = 102)	No Bag (N = 94)
<b>Partner Ratings</b>							
Attraction	5.40 <sub>a</sub> (1.07)	5.54 <sub>a</sub> (1.28)	5.40 <sub>a</sub> (1.21)	5.41 <sub>a</sub> (1.03)	4.92 <sub>a</sub> (1.13)	5.10 <sub>a</sub> (1.21)	5.21 <sub>a</sub> (1.02)
Perceived Similarity	4.59 <sub>a</sub> (1.50)	4.75 <sub>a</sub> (1.63)	4.63 <sub>a</sub> (1.42)	4.69 <sub>a</sub> (1.45)	3.96 <sub>a</sub> (1.43)	4.26 <sub>a</sub> (1.63)	4.37 <sub>a</sub> (1.45)
Friendliness	—	—	5.57 <sub>a</sub> (1.28)	5.68 <sub>a</sub> (1.38)	5.10 <sub>a</sub> (1.48)	5.37 <sub>a</sub> (1.57)	5.47 <sub>a</sub> (1.25)
<b>Activity Ratings</b>							
Enjoyment	—	—	4.72 <sub>a</sub> (1.69)	4.68 <sub>a</sub> (1.55)	—	—	—
Strangeness	—	—	3.60 <sub>a</sub> (1.66)	3.48 <sub>a</sub> (1.72)	—	—	—
Mood	—	—	3.77 <sub>a</sub> (1.01)	3.91 <sub>a</sub> (0.90)	3.85 <sub>a</sub> (0.88)	3.87 <sub>a</sub> (1.01)	3.92 <sub>a</sub> (0.94)
Activity Discomfort	—	—	3.30 <sub>a</sub> (1.72)	3.01 <sub>a</sub> (1.58)	3.33 <sub>a</sub> (1.67)	3.13 <sub>a</sub> (1.71)	3.30 <sub>a</sub> (1.74)
Bag Discomfort	—	—	—	—	3.16 <sub>a</sub> (1.90)	3.46 <sub>a</sub> (2.04)	1.82 <sub>b</sub> (1.48)
“Be Myself”	—	—	—	—	5.28 <sub>a</sub> (1.56)	5.16 <sub>a</sub> (1.63)	5.17 <sub>a</sub> (1.72)

*Note.* Means sharing a common subscript do not differ significantly from one another within each experiment. Dashes indicate the variable was not measured in this experiment.

Figure 1

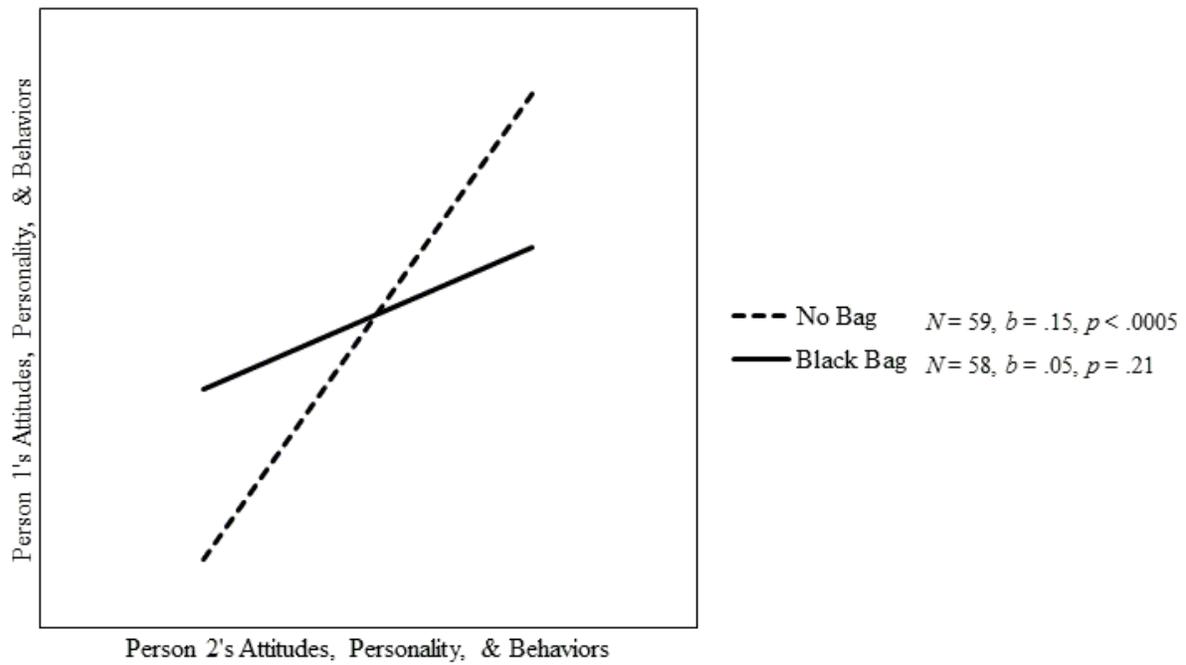


Figure 2

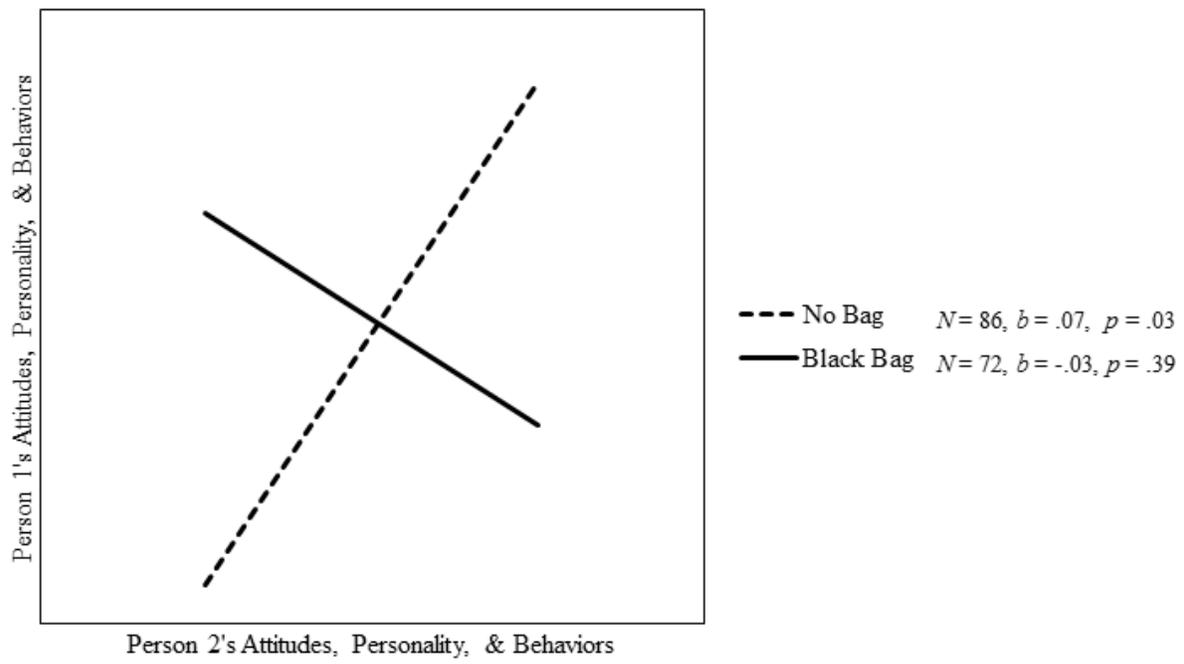
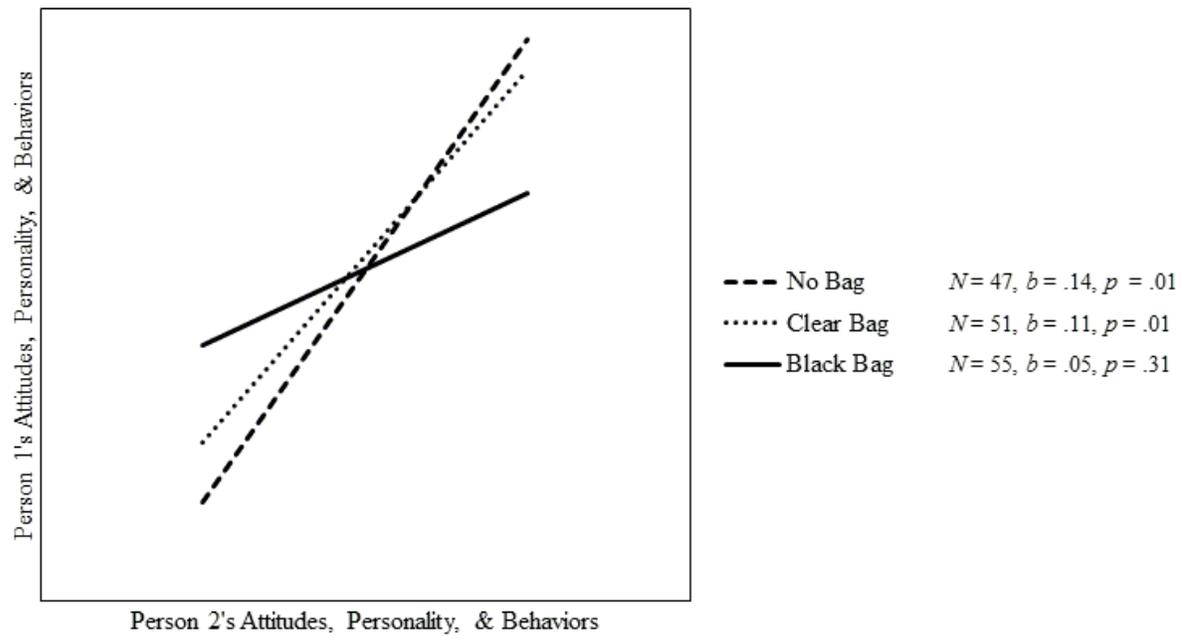


Figure 3



**Figure Captions**

*Figure 1.* The effect of wearing a bag on pair similarity in Experiment 1 as represented by the slope of the line between pair members' attitudes, personality traits, and behaviors. Significant slopes indicate more similarity within pairs than expected by chance alone.  $N$  indicates the number of pairs in each condition.

*Figure 2.* The effect of wearing a bag on pair similarity in Experiment 2 as represented by the slope of the line between pair members' attitudes, personality traits, and behaviors. Significant slopes indicate more similarity within pairs than expected by chance alone.  $N$  indicates the number of pairs in each condition.

*Figure 3.* The effect of wearing a bag on pair similarity in Experiment 3 as represented by the slope of the line between pair members' attitudes, personality traits, and behaviors. Significant slopes indicate more similarity within pairs than expected by chance alone.  $N$  indicates the number of pairs in each condition.