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RECOGNITION OF GENDER IDENTITY AND TASK PERFORMANCE☆

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ABSTRACT

Gender constitutes one of the fundamental distinctions that organize social interaction. It is a salient social distinction in all societies, is a core personal identity for social actors, and is often used to generate expectations for competence in task-focused mixed-sex groups. In this chapter, we explore the effect of androgynous (gender ambiguous) appearance on task performance of observers. We demonstrate that it takes longer for research participants to define the gender identity of such individuals. More importantly, we hypothesize that since androgynous individuals do not fit easily into gender schemas that people use to access information about interaction partners, the presence of an androgynous-looking person will slow performance on a cognitive task. An experimental study

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supports both hypotheses. We conclude with suggestions about how the presence of non-stereotypical interaction partners with ambiguous identities might influence group members' task performance, cognitive inferences about and affective responses to other group members.

Sex category and gender are pervasive, salient parts of the social world (Sanday, 1981). The knowledge structures that are connected to "male" and "female" shape both our own actions and the actions of others toward us (Stets & Burke, 1996). Gender so shapes our expectations for a person that friends and family often find themselves unable to purchase gifts or prepare for a birth without first knowing the sex of the child.

The networks developed by young children in elementary school tend to be dominated by same-sex others (Thorne, 1993; Maccoby, 1998). The sex appropriate behaviors learned through interactions in the home and with peers are reinforced in educational settings. Teachers begin their remarks to classrooms with the phrase "boys and girls" while differential behaviors toward male and female students create self-fulfilling expectations about gender-differentiated interests, competencies, and activities. Peers play a crucial role in sanctioning sex inappropriate behaviors. Moreover, peers influence the types of media consumed by their friends. The messages sent by the many available media sources become an important guide for gender role reinforcement and behavioral expectations. Through these mechanisms, competent members of a social group develop a fairly consensual, richly elaborated understanding of what characteristics are associated with the two dominant sex categories.

Within this consensual context, an individual's expression of gender can manifest itself in a variety of ways. Through clothing choice, mannerisms, and speech styles individuals reveal gender cues to others in their environment. Perceivers then use these gender cues to infer sex. During the infinitesimal time required to access the male or female categories in the memory, perceivers gain access to a great deal of information. This rich information assists perceivers in formulating basic impressions of others. Moreover, this information provides perceivers with the behavioral expectations associated with males and females. Therefore, this process is a fundamental element of the definition of any social situation, guiding interactions, and commonly associated with men and women. Most social actors expect to encounter individuals whose gender expression provides clear cues for inferring sex. Yet, when this expectation is violated perceivers are likely to experience

interesting effects due to the presence of such ambiguous individuals in the social environment. This study is an investigation of the effects of sex category ambiguity on the identification of alters and task performance.

Consider for a moment the following scenario. A young man, Jeff, is walking down a busy sidewalk. Jeff sees an individual sitting on public bench smoking a cigarette. Jeff, a smoker who is out of cigarettes, determines the individual to be a young man approximately his own age and approaches him to ask for a cigarette. As Jeff approaches, he readies himself for the interaction. "Hey bud can I borrow one of those," says Jeff. The individual on the bench looks up, offering a cigarette. Jeff thanks him and sits down. In a slightly high tone, Jeff hears a "you're welcome" from his bench companion. Suddenly Jeff realizes that "he" is really a "she" and he blushes. How does Jeff rectify this situation? Should he? Are there any guidelines for dealing with this type of mistake? These and other questions run through his mind, when he realizes that "she" is asking if he needs a light. Finally, after an uncomfortable pause, Jeff says yes, lights the cigarette, and quickly leaves her alone on the bench. This example illustrates the difficulties of negotiating interactions when we fail to assign the correct sex category to the individuals around us. Sex category classification provides us with the necessary information for orienting the self to others. Incorrect classifications are likely to make individuals uncomfortable because their expectations of others have been violated.

Indeed, the entertainment industry has used this phenomenon to its own purposes. In the late 1980s, the television program *Saturday Night Live* created a popular sketch with Pat, a physically androgynous main character, as the focus. Most of the sketches were set in ordinary places, such as pharmacies, with ordinary people doing commonplace things. The attraction of sketches involved others' attempts to discern Pat's sex. The sketch ingeniously illustrated the importance of sex plays in the basic categorization processes undertaken by perceivers. Pat's novelty and conflicting gender cues caused a significant enough disruption of the categorization process that others were unable to continue with other routine tasks or conversations. Here, we develop an argument using psychological theories of category recognition and impression formation to formulate hypotheses about the effects of gender ambiguity on situation definition and task performance. We then suggest more general implications of our results for social interaction in task groups.

COGNITIVE PROCESSING OF OTHERS' IDENTITIES

A tacit assumption in any model of information processing is that humans have limited cognitive resources. Finite capacity requires individuals to create abstract information structures to increase processing speed and efficiency. These systems allow social actors to quickly process the myriad of stimuli that assail them from their social environment. At the center of such systems, individuals have a variety of knowledge structures including exemplars, schemata, and prototypes. Exemplars are examples used to encode and organize information about new objects. This method often becomes cumbersome when an individual acquires too many examples. Schemas contain bits of information about an object including characteristics and attributes of the object as well as examples. Prototypes portray the representative object at the core of a schema.

Social actors rely on heuristics (cognitive shortcuts) to process and organize incoming information. Heuristics reduce the intricate processing attempts to simpler mental operations, allowing for the efficient processing of information. The most often used is the representative heuristic. When relying on this, individuals compare the salient aspects of a new object to the prototype at the center of a category or schema. Reliance on this heuristic is often associated with stereotyping (Howard, 1995). Although sometimes faulty, heuristics provide actors with a means through which they can categorize and understand their surroundings and the individuals in them. In their dependence on heuristics, actors ultimately sacrifice accuracy in the interest of speed.

Categorization permits perceivers to conserve limited cognitive resources while increasing efficiency. Moreover, this process provides perceivers with a set of beliefs and expectations about others and an initial interactional orientation. The categorization process not only allows perceivers to make denotative inferences about others' characteristics, it also activates affective responses that guide future expectations, actions, and emotional responses (MacKinnon, 1994).

Models of memory assume schemata to be a complex organization of interconnected sets of nodes operating on the principle of diffusion (Anderson, 1983; Pavelchak, 1989). Upon retrieval of a schema, other nodes, including affective evaluations and behavioral expectations, are also activated. Schemata are conceptualized as hierarchical structures with general or category labels at the upper levels; category labels become increasingly exclusive and specific at the lower levels (Pavelchak, 1989). Cohen (1981b, p.

49) defines schema as "a hypothetical cognitive structure that represents association among lower level units of information, resulting in a functional higher-level cohesive meaningful unit." Schemata provide a translation of the continuous stream of others' behaviors and allow perceivers to understand and make sense of their social environment.

People possess an assortment of features, any of which can be used by others as the impetus for categorization. These factors can be roughly organized into three broad, but by no means exhaustive, categories: novelty/salience, relative accessibility of categories in a perceiver's cognitive constructs, and the physical appearance of the target.

Individuals who, as social objects, are novel relative to their surroundings tend to be categorized in terms of the trait that differentiates them from the environment (Taylor, 1981). Bargh and colleagues (Bargh & Pratto, 1986; Bargh, 1986) indicate that categories with frequent and repetitive activation in the past are likely to become chronically active and used in the future categorization of others. Particular categories may be perpetually activated and used as the initial basis for the categorization of all individuals encountered. Features such as occupation or religion may not be as readily discernable as other physical characteristics; thus individuals are likely to rely on visual cues when commencing the categorization process of defining a social situation. Moreover, if an individual's physical characteristics make him or her novel and if this dimension is one that is chronically activated and used by others, it is highly likely that the physical characteristic will become the primary basis for categorization (Madson, 1996).

Research on person perception indicates that in the initial stages of person perception, perceivers use rudimentary categories such as age, sex, and race (Bruner, 1957; Brewer, 1989; Fiske & Neuberg, 1990). Furthermore, the first stages of categorization are unconscious and nearly automatic. Although perceivers may use multiple dimensions in forming impressions of others, Brewer (1989) claims the dimensions of age and sex are the primary categories and other information processing attempts fall along these dimension (i.e. young woman, older man).[1]

Stangor, Lynch, Duan, and Glass (1992) conducted a battery of experiments to determine which social features perceivers use to categorize individuals. In the first experiment, Stangor et al. presented subjects with 24 statements made by two Black women, two Black men, two White men, and two White women in a group discussion. Subjects were then given a surprise recall test, wherein they were asked to match each statement with the appropriate speaker. Subjects made more within-sex errors than between-sex errors. Similarly, there were more within-race than between-race errors.

The researchers replicated Experiment 1 using 10 times as many target stimuli, to eliminate potential categorization based on clothing color, style, or posture. The results refined their conclusions, indicating that sex, not race, was most often used as an independent category for organizing information about the targets and their comments. Following participation in the study, subjects were asked to rate, on a 9-point scale, how much certain social information would give them insight to a individual's personality. The results indicate subjects felt sex, not race, was the most informative piece of information they could receive about another person (Stangor et al., 1992). The results of five experiments support models of person perception that suggest perceivers generally use broad social categories as a starting point for the impression formation process (Brewer, 1989; Fiske & Neuberg, 1990). The results of these studies indicate that perceivers are extremely likely to use sex a primary classification, before race or age.

Schemas are constructed over the life course and contain a large amount of information. When perceivers access a particular node in the memory, it is highly likely that other nodes will also be implicated. The information nodes associated with the male and female schemas provide individuals with a means for orienting the self toward the other. This process occurs very quickly and usually without incident. If a physically androgynous individual disrupts this process, perceivers are likely to experience a great deal of difficulty proceeding with the person perception processes. This investigation is an attempt to discover the effects of such disruptions.

Impression Formation

Much of the person perception process occurs at an unconscious level. Perceivers generally do not take notice of the process unless they do not have a schema for understanding or encoding an individual in their social environment. Mead's view of the person perception process suggests social actors actively select stimuli from their social environment (Mead, 1934). This process involves extracting a particular stimulus from the environment, holding it apart from the others and giving it meaning. Actors then proceed to the manipulation phase, wherein they hypothesize about the nature of the indicated object. Finally, actors enter the consummation stage of the perception process. In this final stage, perceivers make decisions about the object and determine which course of action they should take. In the Meadian view of the perception process, perceivers may take note of and classify a multitude of the information in their surroundings; social actors

ultimately decide which objects come to the fore of consciousness. So, which people do actors extract from their environments and give conscious attention to and which people are classified in an almost unconscious and automatic manner? Cohen (1981a) comments that it is only when perceivers are confronted with individuals for whom there are no schemata that they consciously attend to the process of person perception.

According to models of impression formation, the time required to formulate an impression of an object depends on the fit between prior knowledge and the stimulus (Bruner, 1957; Brewer, 1989; Fiske & Neuberg, 1990). If a perceiver encounters an object or person that is relatively congruent with prior knowledge, the process of impression formation may take little or no time. Moreover, this process may occur at a preconscious level and require few if any of the available cognitive resources. Conversely, if a perceiver encounters an object or person whose traits are highly inconsistent with prior knowledge or experience, the time and resources required to formulate an impression should increase dramatically (Burnstein & Schul, 1983).

The Fiske and Neuberg (1990) Impression Formation Continuum Model brings together previously competing notions of impression formation. One end of the model contains category-based processes, while the other includes attribute-based processes. According to this model, perceivers may use category-based processes to the exclusion of attribute-based processes or vice versa. Moreover, perceivers may use both types of processes in their attempts to formulate an impression of another individual. Fiske and Neuberg (1990) define categories as a broad social feature used by perceivers to organize and comprehend other features of a particular target. Categories often operate as cognitive structures that are very rich in information. Attributes, on the other hand, are likely to be a single feature of a target. Fiske and Neuberg (1990) argue that upon initial exposure to an individual, perceivers are likely to rely on category-based processes to make initial inferences.

The model contains five basic premises. The first premise holds that attribute-based processes are secondary to category-based processes in the process of impression formation. Secondly, movement along the continuum is contingent upon the ease with which perceivers can find a good fit between the target and some pre-existing category. Should a perceiver encounter an individual whose features are not readily compatible with a category, Fiske and Neuberg predict a movement away from category-based processes toward the specific attributes of the individual. The third premise states that initial attention by perceivers to attribute information arbitrates the use of

the continuum. The fourth premise asserts that motivation influences impression formation outcomes. Moreover, according to this premise, perceivers can be manipulated toward either end of the continuum. The last premise claims that motivational influences are mediated by attentional and interpretive responses to specific attributes of an individual.

The Impression Formation Continuum model (Fiske & Neuberg, 1990) includes six steps in the formulation of an impression. During initial categorization, perceivers utilize the physical attributes of a target or verbal or written category labels to cue a label in memory. Once a category is activated, perceivers also access information regarding affective orientation toward, evaluations of, and behavioral expectations for a target. Nearly every target possesses at least four basic types of categories accessible to perceivers: age, sex, ethnicity, and social class. This process occurs very rapidly and is almost imperceptible provided that a target possesses category consistent characteristics.

After initial categorization occurs, perceivers quickly determine if the target is at least minimally or personally relevant. If the target does not meet either of the above criteria, the perceiver dispenses with the impression formation processes and moves on to other information in their social environment. If the target satisfies one of the criteria, the perceiver then attends to other conspicuous information required to form a clearer impression of the target. The perceiver then focuses on other information to determine whether stereotypic or individuating processes will be utilized.

Fiske and Neuberg (1990) incorporate theoretical work by Bruner (1957) indicating that perceivers will attempt to confirm the initial categorization of a target. If confirmation is possible, perceivers will likely utilize the stereotypic process relying on the affective and evaluative orientations and behavioral expectations activated by the accession of the category label. The inability to confirm the initial categorization will result in recategorization. This involves the search for a different category. This process may involve accessing a subcategory, which ultimately allows the perceiver to retain many of the characteristics of the initial category label while simultaneously attending to the exceptional features of the target. Additionally, perceivers may access exemplars or self-categories, all of which have similar consequences for the impression formation process. If recategorization fails, perceivers then shift to individuating processes involving an attribute-by-attribute formulation of an impression.

Impression Formation and Gender Ambiguity

An application of the Fiske and Neuberg (1990) continuum model of impression formation to the central research question of this study provides some interesting predictions. The presence of a physically androgynous individual in a perceiver's social environment should disrupt the impression formation process. As individuals move through their social environment, they take a rough survey of those around them. This survey, according to the Fiske and Neuberg model, should fall along the dimensions of sex, age, or race. Most targets in the environment will not propel perceivers to undertake any further steps in the impression formation process. Yet, if a target is novel, or attracts the attention of a perceiver based on one of the above rudimentary categories, perceivers are likely to spend more time formulating an impression of the person. Thus, the presence of a physically androgynous individual in a perceiver's environment should force toward attribute-based processing strategies, ultimately requiring the perceiver to spend an increased amount of time in impression formation process.

Madson (1996) built upon this impression formation literature to argue that physically androgynous individuals who do not convey clear cues regarding sex would likely divert a participant's attention away from a cognitively demanding task. She speculated that this distraction would increase response times and decrease accuracy on those tasks. Madson (1996) created an experimental task with a picture of an androgynous person on the right side of a split screen while a Stroop task[2] appeared 2 sec later on the left half. The experiment had two conditions. In one condition, the androgynous person had a name label which made his or her sex unambiguous. In the other condition, the picture had a gender-neutral word like "water" under it. In this experiment, participants' response times and accuracy did not vary with the ambiguity of the sex of the pictured person on the right side of the screen.

Other studies, however, found that androgynous pictures led to attributions about non-gender stereotypical traits and about sexuality[3] (Madson, 2000). In addition, participants showed negative affective reactions to sex-ambiguous individuals. These results give us reason to think that the hypotheses about task performance and accuracy might have been rejected because of the experimental format rather than because of theoretical inadequacy. In Madson's (1996) study, the pictures of individuals were all androgynous; whether or not they were sex-ambiguous was manipulated by the label under the picture either a gendered name or a neutral word. We find two problems with this experimental format. First, since all research

participants were exposed to a highly atypical gender presentation, it may be that all were required to do additional processing to encode attributes more consciously. The assumption that supplying a clearly gendered name label would simplify categorization to a stereotypical, schematic level (or at least one that is significantly less complicated than the unlabeled person) may not be justified. The fact that Madson (2000) showed androgynous appearance leads to numerous attributions about non-gender-stereotypical traits, suggests that such appearance may lead to more complex processing even when sex category is established by a name label. Secondly, while the pictures were in the environment of the task, the participants were not actively engaged in the process of categorizing the pictured individuals. Research suggests that if they expected a social interaction to occur, they would have been engaged in a categorization process. But it is possible that if the sex was ambiguous and classification had not occurred by the time that the Stroop task appeared on the other half of the screen, participants might have abandoned their (unmotivated) attention to the picture in favor of the prescribed task at hand (the Stroop task). Therefore, we elaborate the Madson hypotheses to include more restrictive scope conditions that reflect more active engagement by defining the situation with regard to the individual's sex category.

HYPOTHESES

This study was designed to test four primary hypotheses:

1. Exposure to physically androgynous individuals will require an increased amount of time for categorizing the individual as either male or female, relative to gender-stereotypical individuals.
2. More errors of classification as male or female will result from androgynous appearance than from gender stereotypic appearance.
3. Exposure to physically androgynous individuals will cause cognitive interference in other areas, resulting in increased response times on tasks following exposure (relative to exposure to gender-stereotypical individuals).
4. Exposure to physically androgynous individuals will result in lower accuracy in task performance than exposure to gender-stereotypical individuals.

We expect these hypotheses to hold when research subjects actively engage in the task of categorizing the individuals to which they are exposed (as they would if they expected to actually interact with these individuals in a

social situation) in close temporal proximity to the task to be performed. Some level of motivation to complete the task accurately is also necessary, so that cognitive processing will be engaged to a substantial degree. Therefore, we expect these hypotheses, previously rejected by Madson (1996), to hold when (1) physically androgynous stimuli alters are compared with gender-stereotypical alters, (2) the research subjects are actively engaged in the task of defining the situation (categorizing the alters to whom they are exposed), and (3) the research participants are actively engaged in the cognitively challenging task. We design a study to test the four hypotheses within these scope conditions.

METHODS

Constructing Gender-ambiguous Stimuli

A survey was distributed to 36 undergraduate students enrolled in an upper-level sociology course at the University of Iowa. The survey consisted of 30 pictures that had been downloaded from online dating services – 10 males, 10 females, and 10 individuals determined to be physically androgynous by the first author. Participants indicated the sex category of the individuals in the photographs by checking a male or female box. Participants then rated the confidence of their decision for each photograph on a 7-point Likert scale, with 1 being not at all confident and 7 indicating complete confidence. The six pictures with the lowest level of agreement and lowest mean confidence ratings were used as the physically androgynous stimulus photographs in the program. Conversely, the 15 photographs yielding high levels of agreement and mean levels of confidence were used as the stereotypical male and female individuals.

Participants for the Study

Participants for the study were recruited from classes offered at the University of Iowa in the Spring semester of 2002 and at Duke University in the summer of 2004. Procedures and stimulus programs were identical at the two locations; institution is entered into the analysis as a control variable but in no case does it interact with the hypothesized relationships.

Students interested in participating in a sociological study completed a recruiting form and were then called and scheduled to participate in the

study reported here. During the scheduling telephone call, participants were told that the study would take less than an hour and compensation would be approximately $10. A total of 123 students participated in the study, 67 females and 56 males. The average age of participants was 19.9, based on data reported by 120 participants. Participants were randomly assigned to condition within sex.

Experimental Procedures

We designed an experimental study[4] using a 2×2 factorial design which presented participants with a computer-based task similar to that used by Madson (1996). Upon arriving at the laboratory, participants were instructed to read and sign an informed consent document. After addressing any questions raised by the informed consent, they were given a brief overview of the study. Participants were told that they were participating in a study titled Cognitive Processing. They were told that we were interested in how quickly and accurately they could answer the questions and that their payment would be based on the number of correctly answered questions.

The participants were then left alone in a small room with a computer screen, keyboard, and mouse. They were instructed to complete the tutorial and then place a card calling the experimenter under the door of their cubicle room. The experimenter answered any questions that they had about the procedures and then instructed the participants to complete the rest of the tasks, sliding the card under the door when they had finished.

The program used in this investigation presents participants with a number of stimuli; participants select their answers by using a mouse. The stimuli are grouped into three categories: words, pictures, and letter sequencing tasks. Participants are instructed to classify the words as either masculine or feminine, pictures as either male or female and select the correct answer from five choices in the letter sequencing task.

The program consists of 12 rounds of stimuli; each round contains word stimuli, followed by picture stimuli and letter sequencing tasks.[5] Stimuli are presented on a screen that is divided in half horizontally by a bold red line. A stimulus and the corresponding answer options appear in the bottom portion of the screen. After making a choice among the possible answers, the stimulus (but not the chosen answer) moves to the top portion of the screen and a new stimulus and set of potential responses appears in the bottom half of the screen. For example, the word ''clerk'' would appear in the bottom portion of the screen along with buttons labeled masculine and

feminine. After the experimental participant decided whether the word "clerk" was masculine or feminine with a mouse click, the word "clerk" would appear in the top half of the screen and a new word, such as "aggressive", would appear in the bottom half of the screen along with masculine and feminine buttons.

The first two rounds of stimuli are contained in the tutorial segment of the program and consist of two words, two pictures, and two tasks. While not differing from the rest of the program in presentation, the tutorial was designed to provide participants with a chance to practice the type of tasks they would be asked to complete and allow them to become acquainted with the program presentation style.

The remaining 10 rounds are identical in format for both conditions, gender ambiguous (androgynous) and non-ambiguous. The only difference between the two conditions is the presentation of six androgynous pictures in the gender ambiguous condition. In six of the ten rounds, the third picture differed in the gender ambiguous (androgynous) and non-ambiguous conditions.[6] The third picture presented in the manipulation rounds in the gender ambiguous condition was an androgynous individual (as rated in the stimuli development study). Participants in the non-ambiguous condition were presented with pictures that were all stereotypically male or female (again, as rated in the stimulus development study). Other than the six androgynous pictures in the gender ambiguous condition, participants in both conditions saw the same stimuli in the same order.

After the participants had completed the computer task, they slipped a card under the door of their cubicle indicating to the experimenter that they had finished. The study participants then filled out a short questionnaire that consisted of a short form of the Personal Attributes Questionnaire (Spence et al., 1974, 1975) and socio-demographic questions (age, sex, race, major ACT or SAT scores, and GPA). The participants were then debriefed.

Methods and Measures

Our dependent variables take two forms. Because our dependent variable for Hypotheses 1 and 3 will be time elapsed between exposure to a stimulus and the time of response, we measure the duration of this interval in seconds (to the 14th decimal place). We use multivariate event–history techniques to model the timing of the response. The hazard of a response at time t is the probability that the participant responds with an answer at that time, given

that s/he has not responded prior to time t. The general form of the hazard model is:

$$h(t|x) = h_0(t)\exp(xNb)$$

where $h(t|x)$ is the hazard at time t, h_0t the baseline hazard at time t, x the covariation matrix of the independent variables, and b the vector of coefficients to be estimated. Since we do not want to make any strong assumptions about the functional form of the hazard distribution, we use the discrete approximation of the continuous time model described above (Allison, 1994; Yamaguchi, 1991). Here, we construct a data set where the time of response is divided into discrete units (in this case, of 1/100th of a second). Using logistic regression to analyze these time periods in a discrete time approximation of the hazard model has the advantage that it makes no assumptions about the functional form of the underlying hazard distribution, as well as controlling for the possible confounding effects of other variables.

For Hypotheses 2 and 4, the dependent variable is simply the accuracy of the participant's judgment about the stimulus person's sex category or the pattern recognition task that immediately follows the experimental manipulation (the androgynous pictures in the gender ambiguous condition in rounds 3, 5–7, 9, and 10 or the stereotypical pictures in those same rounds for the non-ambiguous condition). Since logistic regressions modeling the relationship between the probability of being correct and the independent variables showed effects only for the experimental manipulation, we present frequency tables and t-tests for these hypotheses.

The most important independent variable is, of course, the experimental condition, *gender ambiguity*. Participants who were exposed to the androgynous pictures as part of their programmed task were coded 1, while participants who saw only stereotypically male or female pictures were coded 0. *Sex* was coded as 1 if the participant was male, female otherwise. *Institution* was coded 0 if the participant was from the first data collection at the University of Iowa, 1 if the participant came from Duke University. To control for heterogeneity of individual response times in performing the tasks, an *individual average response time* variable was constructed for both pictures and tasks.[7] The average picture response time was constructed by summing each participant's response times for the eight pictures that appeared in the program *before* the manipulation occurred under the androgynous condition. This total time was then divided by eight to produce an average picture response time for each individual. The task variable was

constructed in a similar fashion, using the eight tasks that appeared before the first androgynous picture in the experimental procedure.

RESULTS

The survival functions for the responses to the gender stereotypical and the physically androgynous picture stimuli are presented in Fig. 1. While virtually all of the gender schematic pictures had been classified as male or female within three of the 0.01time periods, participants had classified only half of the androgynous pictures within that time frame. More dramatically, virtually none of the participants took more than four time periods to classify the picture, while a quarter of the participants in the androgynous condition took longer.

The mean response time of participants in the non-ambiguous condition to the gender-stereotypical photographs was 1.198 sec, while the average response time to stimulus pictures in the gender ambiguous condition was 3.007 sec. The mean difference between response times to pictures between the conditions is nearly 2 sec. This large difference provides tentative support for Hypothesis 1 and illustrates how the cognitive processing undertaken by perceivers differs when a category target match is not initially possible.

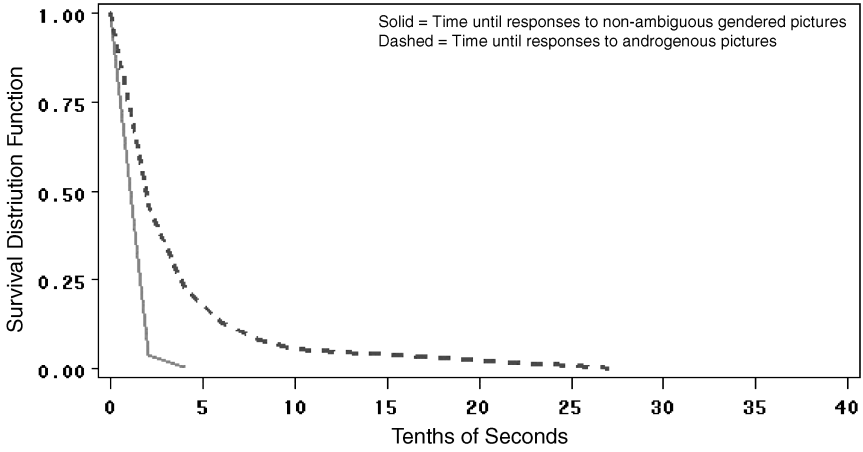

Fig. 1. Survival Plot of Picture Responses by Gender Ambiguity.

Table 1. Accuracy of Picture Recognition by Gender Ambiguity.

Number of Pictures Classified Correctly as Male or Female	Androgynous		Non-ambiguous	
	Frequency	Proportion	Frequency	Proportion
0	17	0.27	0	0.00
1	8	0.13	0	0.00
2	15	0.23	0	0.00
3	15	0.23	0	0.00
4	8	0.13	0	0.00
5	1	0.02	2	0.03
6	0	0.00	57	0.97
Total	64	1.01[a]	59	1.00

Notes: $T = 21.53$ with 121 df, $p < 0.001$.

[a]Proportions do not sum to 1.00 because of rounding.

More complete support is offered for Hypothesis 1 in Table 1, which reports the discrete-time approximation hazard analysis, including the effects of time dependence (without making any assumptions about functional form) and the effects of covariates. Gender ambiguity condition (androgynous vs. non-ambiguous) is highly significant. The individual average response time is a significant determinant of the time needed to classify the stimulus pictures as male or female: some people simply respond more quickly to the mouse-click task than others. Sex of participant and institution have neither main nor interaction effects, and so we omit them from this analysis. There is time dependence in our reaction time data; dummy variables representing time periods are significant when taken as a group.

The accuracy of sex-category judgments (Hypothesis 2) was strongly associated with gender ambiguity condition (androgynous vs. non-ambiguous) condition, which we would expect since we selected the picture stimuli based on a pretest of this variable. Only two of the 59 participants in the control (gender-stereotypical) condition made even one mistake about the gender classification of the stimulus pictures; all of the others got all classifications correct (see Table 2).[8] In the gender ambiguous condition, however, more of the judgments were incorrect than correct (i.e., matching the pictured person's own sex category designation and gender identity). None of the participants in the gender ambiguous (androgynous) condition got all of the classifications correct, and only nine got more than half of them correct.[9] Indeed, one of the first indications that our predictions about ambiguity of

Table 2. Time Until Picture Classification by Gender Ambiguity.

Independent Variable	Parameter Estimate	Standard Error
Intercept	−2.00***	0.13
Gender ambiguity (1 = androgynous)	1.08***	0.09
Average response time[a]	−0.27***	0.07

Notes: (1) The model also includes five dummy variables representing time dependence in the hazard of responding, not reported here because they are not substantively interesting. (2) N of response events = 749; N of time periods = 16,065. (3) Likelihood ratio $\chi^2 = 213.40$ with 7 df, $p < 0.001$.

[a]The average duration of the responses to tasks *before* the first manipulation of gender ambiguity occurred in the androgynous condition.

sex classification interfering with task performance were supported from the fact that participants in the gender ambiguous condition often moved closer to the computer screen, squinted, or glanced back up at the androgynous pictures even when the classification task was finished and the picture stimulus has moved to the top of the screen. A multivariate logistic regression analysis of classification accuracy confirms the strong pattern shown in Table 2; condition (androgynous vs. gender-stereotypical picture) has a strong, statistically significant effect. The only other variable that has a marginal effect is participant's sex: men were slightly more accurate than women in classifying the androgynous pictures as male or female.

Our more interesting hypotheses, of course, involve the letter sequencing task that followed the stimulus pictures (and while the pictures were still present on the top of the computer screen above the task). Hypothesis 3 suggests that the presence of an ambigiously categorized others will interfere cognitively with the task performance, resulting in slower response times. Fig. 2 shows the survival curves for both the androgynous and stereotypical conditions. While not as dramatic as the time difference required to categorize the pictured person, these descriptive data show a clear pattern of longer response times in the androgynous condition. The mean response time to the letter sequencing task following gender-stereotypical pictures was 12.034 sec, while the average response time for the treatment condition was 14.142 sec. The resulting mean difference is over 2 sec. We present a multivariate test of Hypothesis 3, using the discrete approximation model, in Table 3. Gender ambiguity condition (androgynous vs. stereotypical) has a significant effect ($p = 0.008$). The average response speed (computed from stimuli that occurred before the first manipulation) has a strong impact as

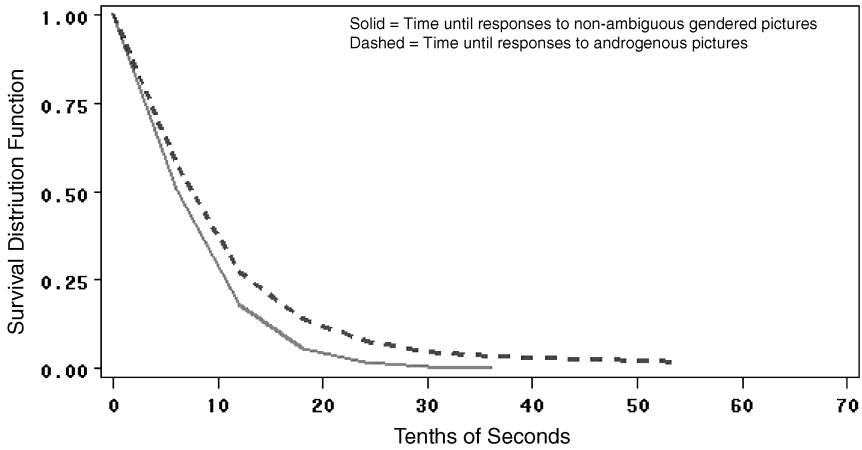

Fig. 2. Survival Plot of Picture Responses by Gender Ambiguity.

Table 3. Task Accuracy by Gender Ambiguity.

Number of Tasks Answered Correctly	Androgynous		Non-ambiguous	
	Frequency	Proportion	Frequency	Proportion
0	0	0.00	0	0.00
1	0	0.00	0	0.00
2	0	0.00	0	0.00
3	2	0.03	0	0.00
4	2	0.03	0	0.00
5	11	0.17	6	0.10
6	49	0.77	53	0.90
Total	64	1.00	59	1.00

Note: T-value for difference in means = 2.32 with 121 df, $p = 0.022$.

well. Finally, the Duke students responded somewhat more quickly than the University of Iowa students to the tasks following the experimental manipulation. There was no effect of participant sex, and the two- and three-way interactions among sex, institution, and condition were not significant; therefore, we dropped these variables from the analysis presented in Table 3. There is significant time dependence in our task response data; dummy variables representing timer periods were significant, taken as a group.

Our final hypothesis suggests that accuracy at the problem-solving task will decline as a result of the distraction and cognitive load of exposure to non-schematic alters. Accuracy on the task was fairly high, with the great majority of the participants deliberating until they had the correct answer. Still, Table 4 shows a marked difference in task performance between the gender ambiguous condition and the non-ambiguous condition. Six percent of the participants who were distracted by a sex-ambiguous person in the top half of the screen missed more than two of the task questions, more than any of the control participants. More than twice as many participants in the experimental condition got at least one task solution incorrect (14 vs. 6). The difference in task accuracy is statistically significant, ($p < 0.022$). As with accuracy of sex classification, a multivariate analysis of task accuracy confirms the strong pattern shown in Table 4; the experimental condition (androgynous vs. stereoetypical) has a statistically significant effect. Participant's sex, institution, and average response time did not have significant effects on task accuracy.

DISCUSSION

We find support for all four of our hypotheses. It was more difficult for research participants to identify the sex category for physically androgynous people who were pictured – both in terms of the amount of time that it took

Table 4. Time Until Task Completion by Gender Ambiguity.

Independent Variable	Parameter Estimate	Standard Error
Intercept	-5.96^{***}	0.18
Gender ambiguity (1 = androgynous)	0.20^{**}	0.08
Average response time[a]	-0.09^{***}	0.01
Institution (0 = Duke)	0.26^{**}	0.08

Notes: (1) The model also includes seven dummy variables representing time dependence in the hazard of responding, not reported here because they are not substantively interesting. (2) N of response events = 748; N of time periods = 97,848. (3) Likelihood ratio $\chi^2 = 644.00$ with 10 df, $p < 0.001$.

$^{***}p < 0.001$.

$^{**}p < 0.01$.

[a]The average duration of the responses to tasks *before* the first manipulation of gender ambiguity occurred in the androgynous condition.

them to process the identification and the accuracy with which they matched the alters' own gender identification. The mean response times for the photographs indicate that individuals in the androgynous condition required more than twice as long to categorize the alters as either male or female. Furthermore, the participants *misidentified* the sex category of the alter over half of the time, an error that would have had serious interactional consequences in a real social situation.[10] The support of our first two hypotheses indicates that definitions of situations in terms of the key personal identities of social actors may sometimes be problematic. When things are confusing, when they do not fit our prototypes for social identities, when our schemata fail and when we have to resort to more detailed processing of characteristics, things take longer and we make more mistakes.

But in a sense, our first two hypotheses are self-evident. We think that Hypotheses 3 and 4 have more interesting, complex implications for group processes. Here, we predicted that participants would experience cognitive interference after exposure to a physically androgynous alters and would require longer processing times and make more mistakes on subsequent cognitive tasks. The data support these less obvious predictions as well.

Our findings suggest support for the Fiske and Neuberg (1990) model of impression formation. Without pre-existing schemas for the categorization of physically androgynous individuals, perceivers were required to proceed through more phases of the impression formation process, resulting in longer response times. The data also support the cognitive miser perspective of information processing and expand the boundaries of the Fiske and Neuberg (1990) model of impression formation. Despite accounting for the presence of a physically androgynous individual in their social environment, participants in the treatment condition experienced cognitive interference when they proceeded to the letter sequencing tasks. The longer response times on the tasks appearing directly after the stimuli indicate that the impression formation process may not conclude once the situation is ''defined'' and identities labeled. Although the physically androgynous alters were of little social significance to participants in the experimental condition, participants clearly continued to devote some of their cognitive resources to those alters, despite having other tasks at hand.

It might be useful to draw out how we think the phenomena that we have studied here might be important for group interaction. It is these extrapolations that will guide our future research agenda. First, group members that are atypical and hard to classify into basic, ubiquitous categories are likely to create a number of challenges for the initial definition of the situation in the group. If members are initially unsure of the definition, they

may engage in cognitive work and interactive probes in order to classify alters correctly. The status structure of the group may not initially be clear. Such status structures are determined partially by classifications on basic status characteristics like sex, age, and race/ethnicity – if these identities are not clear, there may be some period of interaction (either momentary or in the case of age or race, quite extended) where private and public definitions may differ. Non-prototypical instances of male, female, old, young, minority, or majority may also lead to inferences about other non-typical traits or characteristics that the individuals possess. Madson (2000), for example, found that experimental participants assumed that physically androgynous stimulus people were homosexual; and Webster, Hysom, and Fullmer (1998) found that the homosexual/heterosexual distinction has status value. In Affect Control Theory (Smith-Lovin & Heise, 1988), atypical instances of an identity are labeled with modifiers that describe their difference from the prototypical identity occupant. These modifiers have affective meanings that combine with the fundamental sentiments associated with the identity to create a new fundamental sentiment for the person (Averett & Heise, 1987). Maintaining a differing fundamental sentiment, of course, changes the intended actions toward the person by other group members, the expected actions from that individual, and the emotional responses that are predicted by other group members for that person.

We are even more intrigued by the implications of our findings for task performance. Even though our experimental situation was very minimally social in nature, the presence of someone who did not fit cultural schemas associated with gender and sex category was disruptive. One suspects that this effect might be much stronger if any one of a number of additional features were present. First, just knowing that they had classified the other person into the wrong sex category might increase the effect on cognitive processing.[11] Certainly, in an actual social interaction, the embarrassment and negative effect that the situation would arouse would be expected to have substantial effects on later actions.[12] Even more interesting is the potential impact of collaborating with a person whose identity is unclear on a task. This interaction would presumably increase the salience of the ambiguous, problematic identity classification, and heighten its negative impact on task performance. There is also an interesting potential for status dynamics. Are non-schematic individuals who are far from our prototypical identity occupants evaluated more negatively in general, and therefore accorded lower status in the power and prestige orders that develop in task-focused groups? Or does this derogation only occur when and if the individual's appearance leads to inferences about status characteristics that are

already negatively evaluated? For example, would the status effect be reversed if ambiguity of identity led to a positive inference (e.g., a racial minority who look almost White/Anglo)?

Finally, lest our results lead to a conclusion that non-traditional looking people are a potentially negative influence on group interactions and task performances, we want to point out some potentially positive effects of non-prototypical group members. Charlen Nemeth has developed a research program that argues for the positive effects of a strongly voiced minority opinion, *regardless* of that opinion's correctness or content (Nemeth, 1986; Nemeth, Connell, Rogers, & Brown, 2001). She argues that a minority opinion helps to break up the rapid convergence on a majority framing of a task or issue, preventing premature closure and allowing more creative solutions to problems. Here, we suggest a broadening of this proposition. While non-schematic individuals may be harder to classify, harder to predict, and somewhat distracting, their presence may lead to more complex processing and cognitive connections to a wider array of nodes in impression formation. While the affect associated with this extra effort and ambiguity might be negative, there might be payoffs in creativity. Nemeth's research participants ended up disliking the minority and rejecting its influence, but eventually ended up with better performances because of its presence. Perhaps on tasks where creative thought and non-paradigmatic framing are valuable, difficulties in determining the identities of others might have similar positive effects on performance.[13]

The speculations above lead to several directions for further research. First, we would like to see whether sex category is unique in its fundamental importance to the definition of a situation. Will stimulus pictures that are ambiguous in terms of their age, race/ethnicity, or other more role-based identities have the same impact on cognitive processing? Second, will information about the accuracy of the research participant's initial definition of the situation (i.e., the extent to which it agrees with the alter's own self-identity) influence processing? Will this impact be mediated by affective reactions, or will it be cognitive in nature? Third, will making the situation more social make a difference? If the research participants anticipate interacting with the pictured person in the future, will their attempts to define the alter's identity be more important? If they "interact" with the pictured alter in a standard expectation state experimental task, how will the ambiguity of identity (on gender or on other status characteristics) affect the power and prestige order? Finally, are there positive effects on creativity or other group decision-making processes when we encounter group members whose basic identities are unclear or problematic?

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Allison (1984); Andersen & Klatzky (1987); Bargh (1989); Brewer & Lui (1989); Burnstein & Shcul (1983); Spence & Helmreich (1978).

NOTES

1. This perceptual literature fits well with anthropological observations that sex and age divisions are present in all known human societies, and form the basis for more elaborated systems of differentiation and stratification (Sanday, 1981).

2. A Stroop task involves the presentation of a color word in which the color of the letters either matches the color named by the word or is incongruent with the named color. The task requires that the participant answers a question with the color of the letters. Not surprisingly, participants respond more quickly and more accurately when the color word and the text color are congruent than when they are not.

3. Subjects were more likely to assume that androgynous looking individuals were homosexual.

4. The study design was developed by the first author for her undergraduate honors thesis under the direction of Dawn T. Robinson at the University of Iowa. Additional data and the current analyses were conducted at Duke University.

5. The trait and occupation words included in the program are taken from Freedman and Lips (1996). The pattern-completion problem-solving tasks are taken from a cognitive abilities measure developed by Schaie (1985).

6. The manipulation occurred in the third, fifth, sixth, seventh, ninth, and tenth trials.

7. This control variable is conceptually similar to a covariate in a MANOVA.

8. These two mistakes were almost certainly accidental clicks of the mouse used to answer the question.

9. The participants were not informed that their classification was incorrect, as they almost certainly would have been in a social interaction situation. We discuss the implications of this fact in our suggestions for future research.

10. We acknowledge that in many situations other cues might be available to disambiguate the alter's identity. However, physically androgynous individuals often embrace that characteristic and dress, act and otherwise indicate a lack of gender schematic cultural traits. The fact that one of the authors has heard several reports of sex category misidentification from student diaries in sociology of gender classes means that this phenomenon is not unheard of in actual social interactions.

11. Alternatively, having a definitive answer to the question of sex classification could lead to a firm definition of the situation and reduce the impact of the physically androgynous person on task performance. Recall that Madson (1996) used labeled vs. non-labeled pictures to manipulate sex ambiguity in her experimental studies of androgyny and its effects.

12. Wharton and Baron (1987) have shown that workers in mixed sex work groups have lower satisfaction with their jobs (but also see Fields & Blum, 1997). Here, we are suggesting that this effect might be much broader than just a straight-

forward negative effect of heterogeneity. It could be that task interactions with people who we do not understand and can not predict as well are problematic in general. Other-sex people might fit this description to some degree. People whose basic identities are unclear to us initially, and who do not fit our schemas for occupants of those identities might be problematic in similar, perhaps even stronger ways.

13. Clearly, the pattern recognition task that we used in this study does not meet these criteria. There was a single correct answer, which most of the college students were able to discover in a fairly short time frame. Nemeth typically uses tasks where there is an easily accessible but flawed solution, and a better solution that requires "thinking outside the box".

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