Conjunctions of Social Categories Considered from Different Points of View

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Abstract

Conjunctions of divergent social categories may elicit emergent attributes to render the composite concept more coherent. Following Kunda, Miller & Clare, (1990) participants listed and rated attributes for people who belong to unexpected conjunctions of social categories. In order to explore the flexibility in such constructions, they were also asked to adopt the point of view of a person in one of the two categories. Experiment 1 found that when adopting the point of view of one constituent category, people tended to combine the concepts <u>antagonistically</u>, meaning that they attributed to members of the conjunction the more negative aspects of the opposing category. Experiment 2 showed that this polarizing effect was reduced when the point of view category was itself unusual. Strong gender stereotype differences were also found in the degree to which combinations were antagonistic. Female stereotypes as points of view generated a greater degree of integration in the conceptual combination.

The experiments described here stem from a research question originally raised by Osherson and Smith (1981) concerning conjunctions of fuzzy concepts. A fuzzy concept is one that defines a category of exemplars containing not only clear-cut examples, but also atypical and borderline examples. Zadeh (1965) introduced the notion of a fuzzy set to model the reference of fuzzy predicates such as is tall or is red. A man's degree of membership in the category tall men is some continuous function of his height, rather than simply being true above some value and false below it. Zadeh proposed that one could represent degree of set membership with a logical function c that could take continuous values between 0 (clearly not in the set) and 1 (clearly in the set).

Rosch and Mervis (1975) extended the idea of fuzziness to cover the extensions of nouns as well. In their well-known prototype theory they argued that concepts such as fruit or furniture could also be characterized by fuzzy sets. As evidence they showed that people can consistently rate the typicality of category members, and that this typicality variable affects a range of psychological measures of category processing. Hampton (1979) and McCloskey & Glucksberg (1978) showed that many of these noun categories were indeed fuzzy in that people were both in disagreement with each other, and inconsistent themselves in deciding whether borderline cases belonged in the category.

The question then arises of how such concepts could be combined by logical operations such as conjunction or disjunction. In his fuzzy set logic, (Zadeh, 1965), Zadeh proposed two possible rules that could be applied to form the conjunction of fuzzy sets, both of which had the desirable property that if applied to all-or-none concepts, the traditional definition of conjunction would emerge. One rule was the minimum rule, whereby set membership in a conjunction was the minimum of the two constituent set memberships. The other rule was a

product rule, which proposed conjunctive set membership to be the product of the two constituent set memberships. However Osherson & Smith (1981, 1982) argued persuasively that the application of fuzzy intersection rules to category conjunctions such as pet fish or striped apple was doomed to failure. In particular, Zadeh's two rules for conjunction of fuzzy sets entailed the inequality that no item could be a better member of a conjunction than it was of either of the two constituent categories. Yet intuition seemed to argue otherwise, and Smith & Osherson (1984) provided data to make the point that items were frequently considered more typical of a conjunctive concept than of a constituent. Thus a brown apple was more typical of the concept brown apple than of apple, and a guppy was more typical of the concept pet fish than of either the concept pet or the concept fish. Osherson and Smith (1982) were also able to present a logical demonstration that no function could be found that would successfully map constituent concept typicality onto conjunctive concept typicality for all pairs of concept categories.

It soon became apparent in the psychological literature that to account for such conjunctions, it was necessary to provide an intensional model for combining the attributes of each concept, rather than a truth-functional extensional model which would follow Zadeh's approach in defining membership in a conjunction as a function of the membership values for each constituent. These models (Cohen & Murphy, 1983; Hampton, 1987, 1988; Smith, et al. 1988) aimed to explain the conjunction of fuzzy concepts by showing how the attributes of the two concepts are combined. In this way the impossibility of providing a function to map typicality and membership of constituents onto typicality and membership for conjunctions can be circumvented. Hampton's composite prototype model for conjunctions (Hampton, 1987, 1988) showed how two category concepts, defined as

prototype attribute specifications, could be combined into a composite prototype for the conjunction of the concepts. The model proposed that to form a conjunction $A \cap B$ of concepts A and B, the two lists of attributes that define A and B are initially combined into a single list. This first step predicts (a) that degree of typicality in a constituent (number of constituent attributes possessed) will predict degree of typicality in the conjunction, and (b) that if two concepts are combined for which one concept has a higher number of centrally important attributes than the other, then degree of membership in this constituent will dominate membership in the other. Both of these predictions were confirmed.

The model also proposed a second step in order to account for non-compositional effects in category conjunction. The two lists of attributes may contain mutually incompatible values - pets are warm and cuddly whereas fish are cold and slippery. Pet fish clearly can not be both. Attributes are thus lost from the composite prototype in order to render the conjunctive concept consistent. Experience with real world objects, and background theories of the world may both be involved in this stage.

Following this research with semantic categories, Kunda, Miller & Clare (1990) investigated the effects of combining concepts relating to human social categories (see also Hastie, Schroeder & Weber, 1990; Hutter & Crisp, 2005; Kunda & Thagard, 1996). For example, when faced with the concept of a Harvard educated carpenter, what do people generate as the expected composite prototype concept? It appeared from their research that people invoke a range of social theories and background knowledge to "explain" the novel combination, in keeping with an approach to conceptual combination advocated by Murphy (Cohen & Murphy, 1983; Murphy, 1988; Murphy & Medin, 1985). Attributes that were generated for the conjunction focussed on why a Harvard educated person should work as a

carpenter, and what kind of carpentry would be expected to result from a Harvard education. Social categories therefore appear to be a rich area for investigating "non-monotonic" effects in category conjunction, and the experiments described here used similar conjunctions of social categories in order to explore this richness further.

The manipulation introduced in the present research was based on a series of investigations by Barsalou & Sewell (1984) into the effects on category structure of asking people to adopt different points of view. Participants were asked to rate and to rank the typicality of objects in various categories, while adopting different points of view. For example participants rated the typicality of vehicles from the point of view of suburban housewives or redneck farmers. The results showed that point of view could completely change the typicality ranking of category exemplars, and that groups of students were remarkably consistent in adopting the points of view of other groups. When undergraduate, postgraduate and faculty members' points of views were compared, there was even a close agreement between the consensus viewpoint of one group of another's category structure and the other's own viewpoint as they themselves expressed it.

Given that taking a point of view has such a marked effect on conceptualization, we decided to use the manipulation in the current experiments in an attempt to see how adopting the point of view of belonging to a particular social category would affect the degree to which attributes of the category are inherited in a conjunction. Whereas Barsalou and Sewell (1984) measured typicality of category members, there has been no previous study looking at the impact of adopting a point of view on the intensional attributes considered to be true of the class. It was expected that combining a manipulation of point of view with the study of attribute inheritance in category conjunctions would offer insights into both how

conjunctions are formed, and how point of view affects category representations. In

particular, if non-monotonic effects in conceptual combination are the result of an appeal to

background theory in the way that Murphy and Kunda et al. propose, then a change in point

of view should produce a marked change in the characterization of the conjunctive concept,

and hence should affect the kind of emergent attributes that may be found.

Experiment 1

Method

   Participants. Participants were students and other adults associated with City University

London. All were volunteers and native speakers of English and familiar with British

society. Thirty participants generated attributes in stage 1, and 96 participants rated

attributes in stage 2. Participants were allocated to conditions at random regardless of

gender. There were approximately equal numbers of males and females. Those rating

attributes were paid £5 for their participation.

   Materials. Four pairs of social categories were chosen, relevant to a British population.

They were: Conservative Party Supporter/Trade Unionist, Socialist/ Stockbroker, Oxford

Graduate/Factory Worker, and Rugby Player/Man Who Knits.

   The concepts were arranged in pairs to represent antagonistic categories - members of one

could belong to the other but would be unlikely to. As in the study by Kunda et al. (1990),

there was an element of improbability that someone should belong to both categories, as it is

for these combinations that people are most likely to generate emergent attributes for the

conjunction. In addition the categories represent groups that according to stereotypes may be

considered antagonistic in their attitudes to each other.

Procedure. In the first phase of the experiment, participants generated attributes to both constituent and conjunctive categories. In doing so they were always asked to adopt the point of view of one or other of the constituent categories. They were asked to list characteristics of a person in answer to the question: "What would you expect someone with the given point of view to say about the person to be described".

In the second phase, lists of attributes generated in the first phase were combined for each pair of categories, and a new sample of participants were asked to rate how appropriate each attribute was for each category and each conjunction, from a given point of view. Instructions were as follows:

'This study is about the views people have of each other. On each page you will be given a type of person and a point of view from which they may be described together with a set of characteristics which might be used to describe them. Your task is to adopt the given point of view and then rate the characteristics for their appropriateness."

An example was given. The rating scale was a five point scale labeled "Highly Inappropriate, Inappropriate, Neutral, Appropriate, and Highly Appropriate."

Design. There were six groups of participants for the attribute generation task, with five participants in each. Two groups generated attributes to individual constituent categories, and four generated attributes to conjunctions. Each participant in the two constitutent groups completed a booklet with eight pages, each listing one of the eight constituents, with point of view balanced across the two groups. Thus each participant described each constituent once only. Order of constituents was balanced across participants, and there was a constant lag of 4 between the first and second category from each pair. Participants in the four conjunction groups generated attributes for different versions of the four conjunctions, from different

points of view. A given pair could be presented as a relative clause construction in either order (A Conservative party supporter who is a Trade Unionist or A Trade Unionist who is a Conservative party supporter), and these two could be rated either from a Conservative party supporter or a Trade Unionist point of view. These four sets of ratings were distributed across the four groups. Order of rating the four conjunctions was randomized for each participant.

From the attributes listed by the six groups of participants, a master list of attributes was drawn up for each concept pair. The list included the four most frequently listed attributes from each of the eight lists provided by the six participant groups - that is from each constituent and from each order of their conjunction taken from each point of view. Where there was overlap, an attribute was only listed once. Because of overlap, the final lists contained between 24 and 29 attributes, ordered alphabetically. These master lists were then used in stage two of the experiment.

The same design was used for attribute rating as for the generation task, in order to obtain ratings for the master lists for each constituent and each order of the conjunctions from each point of view. As before, ratings for constituents were doubled up so that each participant rated 8 lists, whereas participants in the conjunction rating groups just rated 4 lists. Participants were asked to adopt the particular point of view and then to rate the "appropriateness" of each attribute for the category on a five point scale from Highly Appropriate through Neutral to Highly Inappropriate. Sixteen participants acted in each of the six groups, so that there were sixteen ratings of each attribute in a list for each constituent from each point of view and for each conjunction order from each point of view.

Results

The results are presented in two sections. The first analysis used a correlational approach to consider two issues: first, the prediction of the composite prototype model that importance for a constituent should predict importance for the conjunction, and second the effect that the manipulation of point of view had on the relative importance of each constituent in determining the conjunction. The second section dichotomized the scales so that each attribute was coded as True or False of each concept. (For ease of exposition the rating scale of "appropriateness of description" is treated as a measure of the truth of the attribute as applied to the concept). Cross tabulation was then used to examine the patterns of attribute inheritance. Three questions were addressed: (a) to what extent did the attributes that were judged true of a conjunction correspond to the set union of the constituent attributes, (b) to what extent were there emergent attributes, true of the conjunction but not of either constituent, and (c) how did changing the point of view affect the attributes which were inherited?

Correlational Analysis. The correlational analysis required the calculation of a mean appropriateness rating for each attribute for each of the constituents and each conjunction, taken from each point of view. The five point scale was coded numerically with a +2 for Highly Appropriate, 0 for neutral and -2 for Highly Inappropriate. There were eight mean ratings to be calculated for each attribute, corresponding to four categories -- the two constituent concepts, and the two conjunctions (depending on the order of concepts)-- considered from two possible points of view. Since a correlational analysis was intended, it was important to establish reliable measures for each of the scales. Before calculating mean values for the ratings, a reliability analysis was done within each attribute list, by considering the correlation of each participant's ratings across the list with the total ratings

summed across the remaining participants in the group. Participants with negative

correlations with the group total for a particular attribute list were excluded from calculation

of the mean for that list (between 0 and 5 out of 16 participants were excluded per list).[1]

Final mean reliability for the conjunctions was .88 (Cronbach's alpha) with a range from

.75 to .96. For constituent concept ratings, final mean reliability was .95 with a range from

89 to .98. The familiar stereotypes were therefore more reliably rated than the unfamiliar

(and improbable) conceptual combinations.

Within each of the four concept pairs, correlations were calculated across attributes

between the eight mean ratings: constituent *A*, constituent *B*, *A* who are *B*, and *B* who are *A*,

each as rated from point of view *A* or from point of view *B*.

INSERT TABLE 1 ABOUT HERE

Correlations for the same concept rated from opposing points of view are shown in

Table 1. For example the appropriateness of applying the list of attributes to Socialists as

judged from the Socialist point of view correlated at -0.02 with the appropriatness of the

attributes as applied to Socialists from the Stock Broker point of view. Thus if point of view

had no effect at all, correlations should be high and approach the mean reliability of the two

measures. The effect of changing point of view varied across concepts. In many cases the

manipulation of point of view had a very strong effect (zero correlation or even a

significantly negative correlation), while in other cases the manipulation was relatively weak

(showing a strong positive correlation between the two points of view). For example,

participants imagining themselves to be Conservative party supporters or trade unionists

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[1] The justification for eliminating participants at this stage is that the study is concerned with finding an accurate measure of the prevailing stereotype within the population sampled. Some individuals had different views for some concepts, and including them in the mean would have obscured the results obtained by adding noise to the measures.

shared quite a similar view of a Conservative party supporter who is a trade unionist (r = 0.68), although they held quite different views about each other (r = -.15 and -.27). On the other hand those taking the point of view of rugby players and men who knit shared a similar view of rugby players (r = .76), but significantly opposed views about men who knit who are rugby players (r = -.49). Effects of point of view clearly interacted with the semantic content of the categories in question, since no consistent pattern was seen across categories here. However it can be concluded that point of view was having a powerful effect on most of the categories.

INSERT TABLE 2 ABOUT HERE

Table 2 shows for each point of view the correlations of each constituent with each conjunction, and the intercorrelation of the constituents. For example, attribute ratings for the constitutent Socialist correlated at -.683 with those for Socialist who is a Stockbroker, from the Socialist point of view, and +.303 with the same conjunction from the point of view of a Stockbroker. For the conjunction Stockbroker who is a Socialist, the corresponding correlations were -.502 and +.418. The final column shows the correlation between the two constituents. In this case attribute ratings for Socialist correlated with those for Stockbroker at -.654 from the Socialist point of view, and -.821 from the Stockbroker point of view.

On the basis of earlier research (Hampton, 1987) importance of an attribute for a conjunction would normally be expected to correlate positively with importance for each constituent. For example an attribute such as is competitive would be as important for the conjunction "sports that are games", as it was for sports or games alone. However for 7 of the 8 points of view, a radically different pattern was seen here -- a strong negative relation between the two constituents, a positive correlation of the conjunction with the other's point

of view and a <u>negative</u> correlation with one's own point of view. The positive correlations were generally stronger, so that when the interconstituent correlation was partialled out, the correlation with one's own point of view was often near zero. That is to say there was no correspondence between the attributes considered true of the category adopted as the point of view and the attributes considered true of the conjunction from that point of view. The partial correlation for the constituent that was <u>not</u> the point of view adopted (the Other constituent) was always found to be positive, and was significantly greater than zero in 11 of the 16 conjunctions. The constituent that <u>was</u> the point of view adopted (the Own constituent) had significantly negative partial correlations for 3 conjunctions and significantly positive partial correlations in 2 (both of which involved the Man who knits point of view). These results were confirmed in a regression analysis shown in Table 3.

Regression equations were calculated for each point of view, predicting importance for the conjunction from importance for each constituent - all considered from the same point of view. Looking at the effect of conjunction order, there was a tendency for the fit of the equation to be rather better when the point of view was the head noun. Since otherwise the regression statistics were generally similar for each conjunction order, the reported equations were recalculated using importance averaged across the two conjunction orders. The results are shown in Table 3, together with the adjusted R squared, which is the proportion of total variance explained, the squared reliability of the measure for the conjunction which indicates the proportion of reliable variance there was to explain, and the former expressed as a percentage of the latter.

INSERT TABLE 3 ABOUT HERE

There was a very wide variation in the degree of fit of the regression models. For the Rugby Player/ Man who Knits combinations, practically all the reliable variance in importance for the conjunction could be predicted from constituent importance. For the Oxford Graduate/Factor Worker example, neither of the equations reached a significant level of prediction. The degree of fit also sometimes depended on point of view - for example the socialist point of view gave a better fit (59% explained) than the stockbroker's point of view (16% explained).

For the constituent which was not the point of view (the column labeled Other in Table 3), the beta weights were clearly positive, with a mean of .575, and with 11 of the 16 equations showing significance. This pattern is consistent with earlier results on attribute inheritance (Hampton, 1987, Kunda et al., 1990). For the constituent which corresponded to the point of view adopted, (labeled Own in Table 3), across the first three category pairs the trend was for the point of view constituent to have little positive predictive value (mean = -.109). Indeed in three of the 12 equations it entered with a significant negative value. A negative regression weight implies that across the attribute list, the more an attribute was true of the point of view constituent, then the <u>less</u> it was considered true of the conjunction -- a result that is clearly at odds with any existing theories of attribute inheritance.

The exception to this pattern was the rugby player who is a man who knits. For this combination when taking the man who knit's point of view, the more normal pattern of positive regression weights for each constituent was found. The man who knits was the only constituent to positively predict importance for the conjunction when it was the point of view category.

To recap the results, there was a consistent pattern across the first seven of the eight concept combinations. When people considered a conjunction from the point of view of one of the constituents, they tended to see the attributes of the conjunction as most reflecting those of <u>the other group</u>. For example how true an attribute was seen to be of a socialist who is a stockbroker depended on which point of view one took. From the socialist point of view it depended on how true the attribute was of a stockbroker, while for the stockbroker point of view it was the degree to which the attribute correctly described a socialist that was influential. The one exception was the point of view of the Man Who Knits, where the two constituents were integrated into the combination in a positive fashion.

<u>Attribute inheritance.</u> In order to provide a criterion for investigating attribute inheritance, each attribute was rescored for each scale as simply True or False. A cut-off point of 3.5 on the numerical scale was used to dichotomize the data, corresponding to half way between the Neutral and the Appropriate points on the scale. To simplify the analysis, the two orders of the conjunction were combined for this purpose.

Because the social categories were generally antagonistic, it was felt useful for the analysis to separate out attributes which were considered positively valued from those which were considered negatively valued from a particular point of view. We can then see whether it is primarily positively or negatively valued attributes that are inherited. Two new groups of participants (10 participants in each) were given the attribute lists for each pair of concepts and rated each attribute on a 7 point scale from "very good" to "very bad", according to whether the attribute was something that was generally a good or a bad thing to be from a particular point of view. One group was asked to adopt one constituent as the point of view in making the judgments, and the other group adopted the other point of view.

Means were calculated for each attribute from each point of view, and the scales were dichotomized around the neutral mid-point of the scale to give categories of positive and negatively valued attributes. Point of view was thus kept constant in analyzing both attribute inheritance, and the evaluation of the attributes.

INSERT TABLE 4 ABOUT HERE

The inheritance analysis results are shown in Table 4. Of those attributes rated true of neither constituent, 4 of the 30 positive attributes (13%), and 18 of the 33 negative attributes (55%) were nonetheless considered true of the conjunction. In other words there were 22 "emergent" attributes, across the 8 conjunctions. These are listed in Table 5.

INSERT TABLE 5 ABOUT HERE

Of the attributes true of just one constituent, if that constituent was the point of view adopted (Own in the table), then it was always a positive attribute. Of 65 such attributes, only 11 (17%) were inherited by the conjunction. For the attributes that were only true of the Other constituent (i.e. that which was not adopted as the point of view), most were negative (67 out of 80) and the inheritance rate was 72% for the negative, and 54% for the positive.

The poor fit in some of the regression models was explained here in terms of the number of emergent attributes seen. For example Table 5 shows that there were many emergent attributes for the Socialist/Stockbroker and Oxford graduate/Factory worker combinations, for which the fit had been poor. By contrast, the Rugby player who is a Man who knits, which had a well fitting regression model, showed very few emergent attributes - indeed none at all for the Man who knits point of view.

Discussion

The composite prototype model (Hampton, 1987, 1988) predicts that attributes of each constituent should normally be inherited by the conjunction. How well have the results supported this prediction? First, from the correlational analysis, there was only one category pair where the model provided a good fit -- the Rugby player who is a Man who knits, considered from the point of view of the Man who knits. In each order of the conjunction for this point of view, the regression model explained almost all the reliable variance, and both constituents had significant positive beta weights. For the remaining concepts, the pattern of results failed to support the model -- regression weights and partial correlations for the Own constituent were non-significant or even significantly negative, and there was considerable inheritance failure for the attributes true of the Own point of view constituent. Note that no existing model of conjunction formation would predict negative weights in these regressions. Kunda et al. (1990) found positive weights in their social category combinations. However in some cases the fit in their data was also very poor with less than 10% of the reliable variance explained, suggesting that importance for the conjunction was independent of any constituent importance.

The attribute inheritance pattern shows perhaps more clearly what is occurring in the current data. With the exception of the point of view of the man who knits, 95% of inherited attributes were inherited from the other's consistuent category, and 84% were unfavorable. There are also 22 (28%) emergent attributes for the conjunctions -- again mostly negatively valued.

The emergent attributes (see Table 5) were similar to those identified by Kunda et al. (1990). Some simply reflected the surprising nature of the combination - for example *unconventional* or *confused*. Others offered a more explanatory account, as in *lazy*, *under-*

achiever or *traitor*. Others might well be considered emergent, although they were not rated as such. For example *hypocrite* was generated in the lists for both Conservative party supporter/Trade unionist and Socialist/Stockbroker, and was rated as true of all four versions of the conjunctions. That this attribute did not appear as emergent was the result of the fact that each point of view saw the other category as possessing the attribute already!

One purpose in conducting the study was to investigate whether the types of "theory-based" reasoning used to account for unusual combinations of social categories would vary as a function of point of view. Evidence for this effect was relatively weak, but there was some observed difference for the Oxford graduate who is a factory worker category (our equivalent of Kunda et al.'s Harvard educated carpenter). Causal reasoning in this combination generated emergent attributes to explain how the person became or continues to be in this situation. Furthermore whereas from the Oxford graduate point of view the conjunction was seen as disaffected with the establishment, lazy or having suffered a mental breakdown, from the factory worker point of view there was more focus on failure and under-achievement.

Point of view was just as powerful a manipulation affecting attribute ratings, as Barsalou and Sewell (1984) had found with typicality judgments. However both the effect of point of view, and the process of attribute inheritance itself appear to vary widely across different semantic domains. The Conservative party supporter who is a trade unionist was an example of a very direct contradiction in the minds of the participants (although Mrs Thatcher's election victories in Britain in the 1980s were in part due to the votes of disaffected trade union members). In this antagonistic situation there was a tendency for attributes to become polarized in value -- one's own side is good and the other is bad -- and for the bad to drive

out the good in the case of the conjunction. Thus the more true an attribute was considered to be of the Own point of view category (good) the less true it was considered to be of the conjunction.

Perhaps the most interesting of the differences between categories occurred for the Rugby player who is a Man who knits. From the rugby player's point of view, a man who plays rugby and who knits is basically like any man who knits. The importance of an attribute for a rugby player made no significant contribution to the regression equation, and the inheritance pattern showed the conjunction to be composed largely of the (negatively valued) attributes of the Man who knits. Taking the man who knits point of view, a picture of the tolerant "New Man" emerges. Both constituents were positively weighted in the regression, and the conjunction was composed of positively valued attributes from both constituents. It was the only one of the points of view in which the conjunction strongly reflected the good attributes of the Own point of view constituent.

The conclusion is therefore that antagonistic categories are not all alike. We need a clearer understanding of the different kinds of unusual combinations that can occur if the process of conceptual combination is to be understood. The second experiment was designed to test one hypothesis of why some combinations are antagonistic and others are not.

<div align="center">Experiment 2</div>

The first experiment produced two quite distinct patterns of conceptual combination when the point of view of one or the other social groups was adopted. In seven of the social categories, the adoption of a point of view led to antagonistic combinations, by which someone in the conjunction of two inconsistent stereotype categories was judged to be most

like the "Other" category. In one of the categories however -- the Man who knits -- the combination was much more in line with the findings for natural categories like sports, games, pets or birds (Hampton, 1987), in that attributes were inherited from both constituent categories, and with no antagonism. There may be different post hoc hypotheses concerning this effect. For example, it was the only category which incorporated a relative clause construction in its description. A man who knits is also different from the other categories in that it is itself an unusual category, involving as it does a stereotype which is inconsistent with the gender of the target (knitting in England is most commonly seen as a stereotypically female activity). The hypothesis tested in the second experiment was that the adoption of a gender consistent point of view (a woman who knits, or a man who plays rugby) would result in a more antagonistic conceptual combination than the adoption of a gender inconsistent point of view (a man who knits or a woman who plays rugby). While this hypothesis was generated purely as a post hoc account of the results of Experiment 1, it can also be justified theoretically. Gender consistent points of view are likely to refer to social groups that are "normal" or generally accepted by society. Such groups (such as men who play rugby) may feel less willing to accept the eccentricity of those within them who also belong to gender inconsistent social groups (men who play rugby and also knit). On the other hand, someone belonging to a gender inconsistent group (such as a man who knits) have broken out of the stereotypical mold for their gender, and so may be much more tolerant of people in the group who also belong to gender consistent groups (men who knit and also play rugby).

Method

Participants. Participants were students and other adults associated with City University London, from a range of different social backgrounds and occupations. All were volunteers and native speakers of English and familiar with British society. There ages ranged from 16 to 61 years. Eighty-four participants (51 females and 33 males) generated attributes in stage 1. Ninety-six participants (62 females and 34 males) then rated the attributes in stage 2.   All participants were allocated to conditions at random regardless of their sex. Those rating attributes were paid £5 for their participation.

Materials. Eight pairs of social stereotype categories were generated. For each pair, one of the categories was a typically male stereotype, while the other was a typically female stereotype. The pairing thus led to unusual combinations of concepts. The categories are shown in Table 6.

Procedure. As in Experiment 1, in the first phase groups of participants were asked to generate attributes which might be used to describe each of the 16 stereotypes and their 8 conjunctions, while adopting the point of view of either one or the other constituent stereotype. Instructions were as follows:

"This is a study about the views people have of each other. You are given a type of person to describe and a point of view from which to describe them. You are asked to give a list of characteristics which you would expect someone with the given point of view to say about the person to be described. There are five spaces for your responses, but please do not feel that you must give five responses. If more than five responses occur to you then add them in the extra space given under each question."

A worked example was given for a category not used in the experiment proper. In the second phase, all attributes generated by any of the groups for a particular pair of categories

were listed in alphabetic order, and different groups of participants made judgements about the appropriateness of the descriptions for each of the stereotypes and their conjunctions, again from one or the other point of view.

Design. The design followed the same principles as Experiment 1, with the exception that an additional factor of Gender (of the target not the participant) was added. Thus half the participants received male points of view and male target individuals while the other half received female points of view and female targets. For each group of participants, gender was held constant across point of view and category, and the point of view adopted was always the same gender as the target category being considered. Thus for a combination like Boxer/Nurse, when the target person was male ("a man who is a boxer and a nurse"), the gender consistent point of view was a male boxer, and the gender inconsistent point of view was a male nurse, while when the target person was female the two points of view were those of a female nurse or a female boxer. Thus male points of view of female targets or vice versa were never elicited.

The full design for each phase of the experiment involved twelve different sets of judgments, obtained from twelve different groups of participants. In phase 1, seven participants were allocated to each group. Taking the Boxer/Nurse pair as an example, the first group was asked to take the point of view of a male boxer (a gender consistent point of view) and generate attributes to describe a male boxer. A second group judged the same target category (male boxer) but took the point of view of a male nurse (a Gender inconsistent point of view). A third and a fourth group judged the alternative target category (a male nurse) from the same two points of view (male boxer or male nurse) respectively.

The fifth and sixth groups judged the combined conjunctive category ("a man who is a boxer and a nurse") from the same two points of view again. Finally groups seven to twelve repeated the whole design with the same categories, but with female points of view about females, in place of male points of view about males. Since there had been little or no effect of the order within conjunctions in Experiment 1 (and such effects are generally small or absent in attribute generation and rating tasks, Hampton, 1987), order was held constant in the design. (Manipulating order in addition to all the other factors would have led to a design with a total of 48 different groups of participants). For each conjunction, the gender consistent category was always placed first in the conjunction, as in "A man who is a boxer and a nurse" or "A woman who is a nurse and a boxer". This order appeared to be most natural pragmatically, where the unusual category assignment was placed at the end of the phrase where novel information is normally highlighted in speech. Order effects may also be expected to be small given that both categories were in the relative clause of the noun phrase (unlike earlier studies which used head noun plus qualifier clause constructions such as "A sport which is a game").

Groups 1-4 and 7-10 generated attributes to all 16 individual categories. Groups 5, 6, 11 and 12 generated attributes for the 8 conjunctions. Phase 2 (attribute rating) followed the same design. Because of missing data and incomplete booklets, additional participants were recruited to bring the N for all cells in the design to a minimum of 8. Each of the 8 (category pairs) x 2 (gender) x 2 (consistency of point of view) x 3 (own, other and conjunction) scales were assessed for reliability. All except for 4 had alpha greater than 0.7. Mean reliability was higher for constituents (.91) than for conjunctions (.78).

Results and Discussion

Mean ratings. The appropriateness ratings obtained in Experiment 2 were analysed to generate a full set of 12 mean ratings for each category pair. These 12 means corresponded to four for each constituent, and four for their conjunction, the four in each case corresponding to the two points of view which could be either gender consistent or gender inconsistent, depending on the gender of the target person. Thus for the pair Boxer Nurse, the four points of view would be a male boxer or a male nurse (rating male targets) or a female boxer or a female nurse (rating female targets).

As in Experiment 1, regression statistics were calculated to investigate the degree to which an attribute's appropriateness for a conjunction was related to its appropriateness for the two constituents of the conjunction. Recall that in the antagonistic pattern shown in Experiment 1, there tended to be a positive regression weight for the degree to which an attribute was judged true of the Other constituent and low or zero weight for the degree to which it was true of one's Own constituent category. Results for Experiment 2 are shown in Table 6 (for Gender-consistent points of view) and 7 (for Gender-inconsistent points of view).

INSERT TABLES 6 AND 7 ABOUT HERE

The beta weights were submitted to ANOVA with the 8 category pairs as random variable, and with Gender, Consistency, and Own-Other constituent as three repeated measures factors. There were significant main effects of Gender and of Own-Other, which were included in a significant two-way interaction of Gender and Own-Other ($F(1,7) = 36.95$, $p < .001$). There was also a significant two-way interaction of Consistency with Own-

Other ($F(1,7) = 7.13$, $p < .05$). No other effects reached significance. The data are presented in Figure 1. It is very clear that for three of the four points of view, each constituent plays a strong and positive role in predicting the inheritance of an attribute in the conjunction, as would be predicted by the composite prototype model (Hampton, 1987, 1988). It is only in the case of Male Gender Consistent points of view that beta weights fall. When imagining themselves in a stereotypical male role (e.g. a male boxer), our participants judged that a male who combined male and female stereotypical roles (e.g. a male who was a boxer and a nurse) would not inherit the attributes of the boxer, but only those of the nurse. Although the 3-way interaction did not reach significance ($F(1,7) = 1.26$), it is probably from Figure 1 that with a more powerful design the effect would be seen. According to the significant two-way interactions, Male points of view, and Gender consistent points of view both generated greater imbalance away from one's own category towards the other, in the antagonistic pattern of concept combination.

Attribute inheritance. An analysis was also done of attribute inheritance, similar to that reported for Experiment 1. To save space it will just be summarized here. Attributes for males considered from gender-consistent male points of view were only inherited 45% of the time from their own category, but 93% from the other category. The balance was more even for gender-inconsistent male points of view (74% for own and 68% for other), and for both female points of view (all between 64% and 76%)

Emergent attributes. As in Experiment 1, emergent attributes were defined as those with positive ratings for the conjunction, that had negative ratings for each constituent. These attributes are listed in Table 8.

INSERT TABLE 8 ABOUT HERE

Content analysis of these attributes showed that it was much more common for the male points of view to be antagonistic than for the female points of view. Female points of view tended to be more integrational - taking good and bad points from each constituent.   Note also in Table 8 how the female points of view about females tended to involve many more positively valued emergent attributes than the equivalent male categories. At a rough count, for the men there were 19 negative attributes and only 8 positive, whereas for the women there were 34 positive attributes and only 3 negative. Once again male points of view appeared to take a much more negative and antagonistic view of the conjunction than did female points of view.

General Discussion

It is interesting (but beyond the scope of this paper) to speculate on the meaning of this result for British culture and gender stereotypes. It is apparent that male points of view are more antagonistic, and that males are less able to belong to gender-incongruent categories without being seen in a primarily negative way by those who belong in only one of the categories. These results must however be tempered with the important caveat that these are the opinions of people *adopting points of view* rather than the opinions of people actually in the social categories. It is indeed a remarkable feat of creativity that people are able to perform this task with such apparently clear and systematic results. The ability to adopt the point of view of others is surely at the heart of our empathetic understanding of each other. However it would be valuable to follow the results with studies of actual members of stereotypic groups (boxers and nurses for example), of each gender.

The primary aim of the study was not to investigate sex stereotyping but to learn more about the processes involved in combining concepts that do not normally combine. In line

with previous research (Hutter & Crisp, 2005, Kunda et al., 1990) we have found that interactions occur when unusual or unfamiliar combinations of social categories are formed. More particularly we were able to identify two very different patterns of attribute inheritance. On the one hand, social categories can be combined in an integrative fashion, taking the positive and negative attributes of each category and combining them into a novel composite prototype (see Anderson, 1965). This process is the one that was identified for non-social categories in the earlier work by Hampton (1987, 1997). In order to identify a set intersection of instances in the world, it is necessary to create a set union of the criteria that identify them. Thus, even with vague, prototype-based concepts, the correspondence between intension and extension operates in broadly the same way that it does in classical logic. (To be in the instance class A^B, an item must possess all the necessary features that might be found EITHER in the definition of A, OR in the definition of B). On the other hand, we have discovered that in certain circumstances, people will resist this integration. Particularly when people imagine the attitude that might be taken by a stereotypical male (e.g. a male Rugby player), they suppose that someone in a sexually ambivalent conjunction that includes both male and female characteristics will not inherit the normal typical properties of the male stereotype. Instead an antagonistic pattern of inheritance appears. The fact that the effect is more strong for male than for female stereotypes probably reflects real asymmetries in gender roles in society. It is arguably far less easy for a man to adopt female styles of dress or hairstyle without attracting negative attention than for a female. In British society, it is not at all unusual for females to have short hair, wear baseball caps and jeans, to drink pints of beer and get drunk in the street. Men who might want to wear skirts and high heels and makeup would have a much harder time.

Experiment 1 confirmed that this is not just a pattern seen in gender stereotyping, but is generally true of social categories that have an antagonistic relationship. Socialist stockbrokers are reviled by socialists as being just stockbrokers, and by stockbrokers as being socialists. Neither side is imagined to be willing to acknowledge that the maverick individual would have the positively valued attributes of the group to which they belong. This anatagonistic pattern can be related to the need for conjunctive categories to show a degree of coherence (Kunda et al. 1993). Participants see the irresoluble problems of someone who would be both a socialist and a stockbroker, and so tend to see the conjunction as primarily one or the other (rather like the instability of the Necker Cube). The current studies have shown that this instability can be strongly influenced by the taking of one or the other categories as a point of view.

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Table 1

Correlations between Different Points of View of the Same Category, in Experiment 1.

Concept A	Concept B	A	B	A∧B	B∧A
Conservative P.S.	Trade Unionist	-.15	-.27	.68*	.32
Socialist	Stock Broker	-.02	.43	.25	.38
Oxford Graduate	Factory Worker	.71*	.35	.55*	.42
Rugby Player	Man who Knits	.76*	-.01	-.25	-.49*

Note:

Conservative P.S. = Conservative Party Supporter,

A^B = "Concept A who is Concept B"

Table 2

Correlations between Constituents and Conjunctions in Experiment 1.

Point of View	Conjunction Order	Constituent A with Conjunction	Constituent B with Conjunction	A with B
Conservative P.S. (A)	AB	-.794*	.813*	-.759*
	BA	-.310	.537*	
Trade Unionist (B)	AB	.694*	-.646*	-.774*
	BA	.864*	-.863*	
Socialist (A)	AB	-.683*	.776*	-.654*
	BA	-.502*	.649*	
Stock Broker (B)	AB	.303	-.137	-.821*
	BA	.418*	-.293	
Oxford Graduate (A)	AB	-.273	.370*	-.736*
	BA	-.205	.326	
Factory Worker (B)	AB	.287	-.478*	-.406*
	BA	.625*	-.305	
Rugby Player (A)	AB	-.643*	.859*	-.866*
	BA	-.799*	.940*	
Man who Knits (B)	AB	.373*	.761*	-.177
	BA	.423*	.761*	

Note: Conservative P.S. = Conservative Party Supporter

* significant at 0.05

Table 3

Regression Statistics for Predicting Importance for a Conjunction from Importance for each

Constituent, within a Particular Point of View, Collapsed across Order of Conjunctions.

Point of View	Beta weights			Adjusted		%
Constituent	Own	Other	R	Rsquare	alpha^2	explained
Conservative P.S.	-.135	.645*	.752	.532	.671	79%
Trade Unionist	-.393	.501*	.843	.689	.880	78%
Socialist	-.229	.583*	.753	.530	.891	59%
Stock Broker	.266	.610	.420	.108	.687	16%
Oxford Graduate	.040	.386	.358	.049	.893	5%
Factory Worker	-.267	.359	.527	.212	.832	25%
Rugby Player	.213	1.111*	.933	.858	.902	95%
Man who Knits	.873*	.563*	.951	.896	.935	96%

Note: Own = Constituent category whose point of view was adopted,

Other = Constituent category whose point of view was not adopted.

* significant at .05

Table 4: Attribute inheritance for positively and negatively evaluated attributes true of each constituent. Own = point of view adopted. Other = point of view not adopted.

	Positively evaluated		Negatively evaluated	
	True of conjunction	Not true of conjunction	True of conjunction	Not true of conjunction
True of Neither	4	26	18	15
True of Own	11	54	0	0
True of Other	7	6	48	19
True of Both	2	0	0	0

Table 5. Emergent Attributes in Experiment 1

Category A	Category B	Point of View	Emergent Attribute
Conservative	Trade Unionist	Conservative	Traitor
Conservative	Trade Unionist	Trade Unionist	Traitor Confused Strange
Socialist	Stockbroker	Socialist	Champagne Socialist Traitor Unconventional Unrealistic
Socialist	Stockbroker	Stockbroker	Champagne Socialist Not a true socialist Unconventional
Oxford Graduate	Factory Worker	Oxford Graduate	Disaffected Lazy Possible mental breakdown Something wrong with him Unconventional
Oxford Graduate	Factory Worker	Factory Worker	Failure Something wrong with him Unconventional Under-achiever
Rugby Player	Man who knits	Rugby Player	Confused Relaxed
Rugby Player	Man who knits	Man who knits	-----

Note: Conservative = Conservative Party Supporter

Table 6

Regression statistics for predicting attribute ratings for the conjunction from attribute ratings

from each constituent, for gender-consistent points of view (Category A as point of view).

Note: Own= rating for the constituent which was adopted as point of view.

	GENDER CONSISTENT POINTS OF VIEW		Beta weights		
Gender	Category A	Category B	Own	Other	R
Male	Car Mechanic	Reads Romances	.018	.821*	.811
Male	Tractor Driver	Ballet Dancer	-.165*	.722*	.790
Male	Fighter Pilot	Child Minder	.709*	.720*	.838
Male	Road Digger	Does Embroidery	.115	.925*	.852
Male	Football Hooligan	House husband	.042	.649*	.614
Male	Rugby player	Knits	-.036	.665*	.695
Male	Refuse collector	Makes cakes	.090	.703*	.662
Male	Boxer	Nurse	.212*	.701*	.689
Female	Reads Romances	Car Mechanic	.905*	.952*	.672
Female	Ballet Dancer	Tractor Driver	.851*	.353*	.783
Female	Child Minder	Fighter Pilot	.531*	.643*	.864
Female	Does Embroidery	Road Digger	.860*	.967*	.678
Female	House wife	Football Hooligan	.232*	1.036*	.874
Female	Knits	Rugby player	.402*	.942*	.876
Female	Makes cakes	Refuse collector	.609*	.965*	.758
Female	Nurse	Boxer	.755*	.542*	.876

Table 7

Regression statistics for prediction attribute ratings for the conjunction from attribute ratings

from each constituent for gender inconsistent points of view

	GENDER INCONSISTENT POINTS OF VIEW		Beta weights		
Gender	Category A	Category B	Own	Other	R
Male	Car Mechanic	Reads Romances	.742*	.317*	.724
Male	Tractor Driver	Ballet Dancer	.507*	.411*	.556
Male	Fighter Pilot	Child Minder	.454*	.664*	.910
Male	Road Digger	Does Embroidery	.637*	.597*	.740
Male	Football Hooligan	House husband	.321*	1.030*	.845
Male	Rugby player	Knits	.561*	.753*	.801
Male	Refuse collector	Makes cakes	.279*	.550*	.504
Male	Boxer	Nurse	.585*	.724*	.810
Female	Reads Romances	Car Mechanic	.941*	1.160*	.820
Female	Ballet Dancer	Tractor Driver	.280*	.849*	.882
Female	Child Minder	Fighter Pilot	.831*	.495*	.865
Female	Does Embroidery	Road Digger	.570*	.871*	.642
Female	House wife	Football Hooligan	.863*	.587*	.705
Female	Knits	Rugby player	.954*	.723*	.753
Female	Makes cakes	Refuse collector	.534*	.610	.632
Female	Nurse	Boxer	.212*	.731*	.842

Table 8

Emergent attributes with Gender consistent and inconsistent stereotypes.

CATEGORIES	POINTS OF VIEW			
	MALE		FEMALE	
	CONSISTENT	INCONSISTENT	CONSISTENT	INCONSISTENT
CAR MECHANIC who READS ROMANTIC FICTION	Dissatisfied Elusive	Dissatisfied Reliable Lonely Soppy	Ambitious Broad-minded Clever	Easygoing Calm Charming Caring Intelligent
TRACTOR DRIVER who is a BALLET DANCER	Passive Unserious	Confused Dirty Eccentric Peculiar	Bold Unconventional Enjoys herself Satisfied	Soft
FIGHTER PILOT who is a CHILD MINDER	--	Untroubled	Contradictory	Fun loving
ROAD DIGGER who does EMBROIDERY	Single Multi-talented Dare to be different Easy	Unusual	Adventurous Challenger Just does a job Healthy	Unstereotypical Unusual Positive
FOOTBALL HOOLIGAN who is a HOUSE HUSBAND/ WIFE	Homosexual Changeable	Vain Changeable	Eager Sporty Unfulfilled Adventurous Football supporter	Antisocial
RUGBY PLAYER who KNITS	--	Brave Funny Eccentric Strange Uncaring of image	--	Organised Well-rounded
REFUSE COLLECTOR who MAKES CAKES	Confused Articulate Simple	Miserable Unsociable Unusual Strange	Simple Broad-minded Determined Equality	Adept Clever Enjoys life Fulfilled Multi-talented Positive Same beneath Broad-minded Determined

				Fun loving
BOXER who is a NURSE	Repressed Uncompetitive Emotionally split Strange	Dissatisfied Rival	--	--

Figure 1

Mean beta weights for regressions predicting conjunctive from constituent attribute ratings, for gender-consistent (black bars) and

gender-inconsistent (grey bars) points of view.