COMPLEX SOCIAL CATEGORIES[*]

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Two experiments were conducted to explore the nature of the cognitive representation of the complex social category and its relationship to its constituent simple categories. Four models reflecting four possible ways the feature structure of the complex category could be related to the feature structure of its constituent categories were proposed and evaluated in terms of applicability. The content structure of a complex category was predicted to evolve over time and significant differences were predicted between the novel and the existent or familiar complex category.

Subjects were asked to consider a novel or a familiar combination of social category memberships and asked to describe a member of the complex category. Their responses were compared to the responses of subjects who described members of the simple constituent categories (in the first experiment) or to their own descriptions of members of the simple constituent categories (in the second experiment). Subjects' representations of complex categories were also analyzed in terms of their attribute components.

The results of Experiment 1 clearly demonstrated people's abilities to represent multiple social categories as complex categories. No single pure model was found to be applicable. A combination of the emergent, hierarchical, and conjunctive category models seemed more appropriate. The novel category and the existent complex category differed in terms of how much difficulty subjects seemed to have in generating the list of attributes as indicated by the length of the listing time.

The results of Experiment 2 were fairly consistent with the findings of the first experiment. The same differences between the novel and the existent complex category conditions were found regarding attribute components of the cognitive representation. An emergent category model with elements of hierarchicality and category conjunction seemed most applicable. The novel complex category was also found to be less rich and more difficult to describe compared to its constituents whereas the existent category was, at least, equally rich and easy to describe compared to its constituents.

The results of this study have implications for research and theory on stereotypes, social identity and intergroup relations.
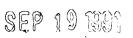
Medin and Smith (1984) discuss two types of categorization: simple and complex. Simple categorization, the assignment of an entity to one discrete category, has been the major focus in both the cognitive and social psychological literature and the term "category" often refers to the mental representation of a simple class. (For a review of the literature on simple categories, see Smith and Medin, 1981.) There are many instances, however, when an entity is cross-categorized, belongs to many different classes at the same time, or may be categorized as a conjunction of simple classes. Categories like male athletes, woman doctor, etc. can be thought of as composites of two simple categories (males and athletes, women and doctors). These complex composite social categories are the focus of interest in this research. What is the nature of these composite categories and what is their relationship to their constituents?

Medin and Smith (1984) note the growing interest in this issue in the experimental cognition literature. Several theories have been proposed in the natural object and semantic domain literature for the structure of complex categories and some degree of empirical support has been provided for each (Ashby & Gott, 1988; Clark, Gelman, & Lane, 1985; Cohen & Murphy, 1984; Downing, 1977; Hampton, 1987, 1988; Osherson & Smith, 1981).

In the social domain, however, there has been less theory and research on complex categories. Multiple group memberships are acknowledged and often referred to in the literature, (e.g., Allen, Wilder, & Atkinson, 1983; Levine & Campbell, 1972; Wilder, 1986), but discussions about their structure and use have been cast mainly in terms of simple categorization. Although there is work on the cognitive integration of complex information in other areas like attitudes (Anderson, 1971; Fishbein & Ajzen, 1975; 1981; Rosenberg, 1956) and impression formation (Anderson, 1981; Fishbein & Hunter, 1964; Hendrick, 1968), there are few studies on cognitive structures and processes involved in the integration of multiple social category information to arrive at a complex composite concept. Research on multiple social categorization has focused instead on the relationships of the multiple group memberships to one another and the consequences on intergroup interactions.

For example, Deschamps and Doise (1978) noted that "the social environment of an individual (or the conceptions he has of it) does not always consist just of his own membership group and another group; but rather, it will sometimes include a network of categories which, instead of being in a simple juxtaposition, will tend to cut across each other (pp.143–144)." Doise and his associates compared a simple categorization situation with two types of multiple categorization situations: superimposed categories and crossed categories. Cross-categorization involves a situation where a target may be classifiable as an ingroup member on the basis of one group membership but as an outgroup member on the basis of another group membership. Superimposed categorization occurs when the target is classifiable as an ingroup member on the basis of all relevant group memberships. Doise and Deschamps (1978) investigated the effects of such multiple representations on intergroup discrimination. Using intergroup discrimination in the simple category situation as the baseline, they found that intergroup differentiation was greatest in superimposed categorization (following Tajfel & Wilkes, 1963, accentuation theory prediction) and least in crossed categories. Intergroup discrimination between subjects based on gender was eliminated when the gender categorization was crossed with a random categorization like the color of subjects' ballpoint pens. Vanbeselaere (1987) replicated these findings using color of writing equipment and supposed preference for a certain nature scene on slide as the basis for grouping (cf. Brown and Turner, 1979). Commins and Lockwood (1978) also demonstrated reduced intergroup discrimination in crossed categories, using the real group category of religion (Catholics versus Protestants in Northern Ireland).

The above studies demonstrated that awareness of one's own and others' complex social categorization has an impact on one's social identity which in turn affects the degree of intergroup discrimination manifested. Exactly what the cognitive mechanism is that makes complex categorization different from simple categorization was left unexplored. Arcuri (1982) attempted to answer this question by studying the influence of categorization situations on "attribution memory." He demonstrated that the complex category, as defined by the conjunction of simple categories, had stronger or weaker category boundaries depending on the relationship of the component simple categories to each other.

Brewer, Ho, Lee, and Miller (1987) were also interested in cross-categorization situations and tested four models of the possible pattern of effects on social identity: category dominance, additivity, category conjunction, and hierarchical ordering. They tested the validity of these models as applied to category distinctions based on gender and ethnic identity among Hong Kong Chinese school children. They interpreted their results as conforming to the hierarchical ordering model. There is some ambiguity in their findings, however, in that results were not consistent across the two dependent measures used.

In a more recent paper, Brewer (1988) favors a subtyping process in social categorization and argues for a hierarchical model where all social categories may be viewed as "nested within superordinate sets defined by partitionings along a few primary dimensions." Thus multiple categories are not necessarily just the intersection of all the simple categories that are involved in the composite. The composite "woman and doctor," for example, is not just the intersection of the concepts "woman" and "doctor." Brewer makes the case that it is a subtype of the category "woman," gender being the primary dimension here. The concept "woman and doctor" is distinguished from the concept "man and doctor" wherein doctor is the primary dimension. The "woman and doctor" is categorized mainly as a "woman" with some additional attributes from the "doctor" category, whereas the "man and doctor" may be categorized mainly as a "doctor" with the additional feature of maleness. Thus the "woman doctor" is basically a "woman" who is also a "doctor" but the "man doctor" is a "doctor" who just happens to be a "man." According to Brewer, this difference in dominant aspects for various multiple category situations is probably due mainly to the individual's socialization or learning history.

Clearly, there is evidence that the perceiver is aware of the multiplicity of group memberships and sometimes integrates this information in order to arrive at an appropriate response. In most of the studies, the response of interest has been a social judgment reflective of one's social identity. Neither the nature of the integrated information nor the integration process itself has been elaborated upon. It should be further noted that in these studies, the subject was an ego-involved perceiver acting on the multiplicity of his or her own group memberships. This is due mainly to the various researchers' focus on the social identity issue. There is no information available about whether the process holds for a perceiver acting on the multiplicity of an unrelated target's group memberships.

Proposed Models for the Structure of Complex Social Categories

The primary focus of interest in this research is the structure of the complex category and its relationship to the structure of its constituents. More specifically, the content of the complex multiple category representation and how it compares to that of its constituent simple categories is of interest here. Unlike in the natural object and semantic domains, there are no elaborate theories about complex social categories and their structural relationship to their component simple categories. The literature on multiple group memberships, however, provides insights into several possibilities and various models have been proposed. Using these insights and borrowing elements from the natural object theories to expand available models, several models for the structure of complex social categories will be proposed. These models reflect various ways of feature integration in the complex multiple category.

The first model is the *additivity model*. In this model, the description of the complex multiple

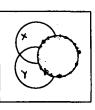Figure 1. Schematic diagram of the proposed models

A. The additivity model   B. The hierarchical model

C. Category conjunction model   D. Emergent category model

Note: The shaded areas surrounded by the dotted line represent the complex category.

category is the union of the features of the component simple categories. Thus a "woman and doctor" will be described in terms of the features of woman plus the features of doctor. See Figure 1a for a diagram of this model.

The second model is the *hierarchical model*. In this model, the description of the complex category is composed primarily of the features of one of the constituent categories (i.e., the dominant category) plus some features of the other categories. Thus, the "woman and doctor" is categorized mainly as a woman with all the features of the "woman" category. However, in addition, she has some features that differentiate her from the prototypic woman and these are the distinctive features from the "doctor" category, including the category label itself. Unlike the additive model, however, the contribution of features by the components is unequal and it is expected that most of the features are derived from the dominant component. The complex category in this model is viewed as merely a subtype of the dominant simple category. Figure 1b provides a diagram of this model.

Category conjunction is a third possible model. In category conjunction, the complex multiple category is represented in terms of the common features of its simple constituents, as the intersection of the components. The "woman and doctor" may be described in terms of the features held jointly by the categories "woman" and "doctor." A sample attribute might be "nurturant." This model is depicted in Figure 1c.

A final possibility to be considered is an *emergent category* model. The complex category may be represented as a concept totally different from its constituents, possessing emergent, new attributes. The "woman and doctor" may be described in terms of features unique from either "woman" or "doctor" features. Refer to Figure 1d for a representation of this model.

The content structure of a complex category in all likelihood evolves over time and experience. It is possible that the models presented above characterize different stages in the development of a complex category. When confronted with an unfamiliar complex category, for example, the perceiver may attempt to represent this by retrieving from memory the prototypes of the constituents and adding those together to arrive at a complex prototype. Whether the additive or the hierarchical model applies will depend on whether the constituent categories are equally dominant or familiar. Equally dominant constituents should be equally represented in the complex category list of features. A dominant category may have more attributes passed on to the complex category compared to the less dominant constituent, resulting in a hierarchical feature structure. Over time, however, the perceiver's initial complex category representation may change in content. This could be due to the fact that the person has had the chance to process and integrate a more coherent complex category representation from the constituents. Or more possibly, contact with category members could have led to the discovery of the inappropriateness of some of the features in the original representation or the discovery of additional features. At this stage, the emergent model or the category conjunction model may be more appropriate.

Hampton (1987) discussed the emergence of new properties in the complex category which result from feedback from one's experience with the category. Greater personal experience with a complex category should result in the development or evolution of featural knowledge about the complex category independent of what one already knows about its components. It is possible that the complex category acquires its own set of features over time and experience. These features may supplement or supplant what was inherited from the constituent simple categories. Thus, over time, an emergent complex category may result.

Methodology

Two experiments were conducted to answer our questions of interest. Experiment 2 was de-

signed to replicate the findings of Experiment 1 and to follow up on certain questions which were opened or left unanswered by the initial study.

Experiment 1

The first experiment was designed to explore the nature of the cognitive representation of the complex social category. Of specific interest was the content of this representation and its relation to the content of the representation of the simple constituent categories. Subjects were one hundred and twenty University of California at Santa Barbara undergraduates (86 females and 24 males) who were enrolled in a Psych 1 class and who participated in the experiments in partial fulfillment of course requirements. The true subjects ($N = 30$) were randomly assigned to the cells of a 2 (category novelty: novel vs. existent) x 4 (target category) mixed factorial design. The first factor was between subjects whereas the second one was manipulated within subjects. In addition, target category was a factor nested within category novelty.

Subjects were asked to consider a *novel* combination of social category memberships and asked to describe a member of the complex category by listing 10 descriptive adjectives or features this person may possess. Their responses were compared to the responses of subjects who described members of a *known* and *familiar* complex category. Descriptions of the complex categories were also compared to descriptions of their respective simple constituent categories.

The feature lists were therefore our primary dependent variables. Consensus lists were derived from the attributes generated by the subjects using Cantor and Mischel's (1979) procedure. For each target category and category structure, a list of attributes was obtained which contained only those attributes that at least 2 subjects had listed. This particular criterion which has been used by past researchers (Cantor & Mischel, 1979; Deaux, Winton, Crowley, & Lewis, 1985) was adopted in order to rule out

idiosyncratic responses without excluding too many of the given responses.

Similar responses were classified together initially by the experimenter (on the basis of thesaurus listings). Subsequently, two judges from the same subject population (but uninvolved in the study) reviewed the lists independently of each other and indicated their agreement or disagreement with the initial classifications. Disagreements were then resolved by discussion. This technique produced a set of nonredundant consensus-based attribute lists. Three consensus lists were derived for each target category, one for the complex multiple category condition and one for each of the simple constituent category conditions.

The consensus lists were used to score individual subject responses. This strategy has been effectively used in previous cognitive research to filter this kind of data to arrive at a purer measure of the salient features included in one's representation of the category. All analyses of variance were conducted on the individual subject scores.

There were several goals in this methodological approach. Of primary interest was the relationship between the complex category attributes and the attributes of its constituents. The applicability of the four models presented was tested. It was predicted that the complex category would possess attributes of the constituent categories to varying degrees, depending on the applicable model. If the additivity or hierarchical model were true, we would expect each component category to contribute features to the complex category. If the appropriate model were additive, we would further expect that the attribute contribution from each constituent would be symmetrical. If the appropriate model were hierarchical, however, there should be more features from the dominant or more salient component. If the category conjunction model were the case, we would expect the complex category to have a predominant proportion of its features to be features possessed jointly by its constituent categories. Finally, if the emergent category model was

the applicable model, we would expect a large proportion of the complex category attributes to be new features.

Processing differences between the complex category and its simple constituents were also of interest in this study. How difficult or how easy is it for subjects to access or retrieve information about a complex category compared to its constituents? If in conceptualizing a complex category one has to integrate information from the simple component categories, then it should take longer to access or retrieve information about the complex category than about the component categories. If we use complex categories directly, it should be just as easy to access information about it as it is to access information about the simple constituent categories once a complex category has been established (i.e., a familiar, existent category).

A final goal in this experiment was to compare existent complex categories with unfamiliar, novel complex oategories in order to track any possible developmental aspects of complex categories. It was predicted that novel complex categories would differ from existent complex categories in terms of structure and processing. A different structural model could possibly apply to the novel complex category compared to the existent category. A pretest was conducted before actual experimentation to select the novel and familiar categories. Under novel complex social categories were included artist-doctor, athlete-judge, feminist-nun, priest-scientist. The existent categories were evangelist-swindler, minister-politician, soldier-statesman, singer-actor. We had also earlier decided to use these occupational categories instead of ethnicity categories which might have been more interesting and real but would also have been more affectively-loaded and possibly confounded, making assessment of the results more problematic.

Experiment 2

The paradigm for the second experiment was very similar to the first experiment except for some variations. Ninety-six University of California, Santa Barbara undergraduates (68 females and 28 males) participated in partial fulfillment of an introductory psychology course requirement. Subjects were randomly assigned to the cells of a 2 (category novelty) x 4 (target category nested within category novelty) x 6 (order of presentation) mixed factorial design. The first and the third factors were both between subjects while the second factor was manipulated within subjects.

Unlike in the first experiment, subjects in the second study were not constrained to listing just ten attributes but were asked to list as many features as possible. This was done in order to obtain a measure of category richness. It was of interest in this study to compare the complex category to its constituents in terms of richness and thus, its ultimate predictiveness.

The second study had several new features. First, the number of target categories was decreased to two from the original four for the novel and existent category conditions each in order to provide a more focused interpretation of the data. Second, category structure was made into a within subjects factor instead of the between subjects factor in the first study to control for some of the within subjects variance. Each subject therefore had to list features not only for the multiple category condition but also for the constituent category conditions.

Results and Discussion

The results of the first experiment provided some interesting information about the complex cognitive category relative to its simple constituent categories. First, there was evidence to suggest that in thinking about the complex category, perceivers made use of information about the simple component categories.

Table 1. Experiment 1: Partition of Attributes in the Complex Category.

	Category novelty:	
	novel	existent
Attribute Type		
category x attribute	.32^b	.16^c
category y attribute	.31^b	.22^c
joint x and y attribute	.09^d	.24^c
emergent attribute	.28^b	.39^a

Note. Numbers are mean proportions of attributes of a particular type. Means with different superscripts differ significantly from one another (by the Scheffe post hoc comparison method).

The data from the analysis of multiple category components showed that over half of the attributes listed for the complex category were also attributes mentioned as characteristic of the component simple categories.

In terms of the models tested, the results of the first experiment indicated that no single pure model may be applicable. A combination model integrating elements of the emergent, hierarchical, and the category conjunction models may provide a better fit when describing the structure of the complex category.

It was also initially hypothesized that the existent complex category would ultimately function just like any simple category. The list generation time data was consistent with this prediction.

Table 2. Experiment 1: Baserate figures for the various types of attributes.

	Category novelty:	
	novel	existent
Attribute type:		
category x attribute	21.50	16.50
category y attribute	22.50	19.25
joint x and y attribute	1.50	4.50

When the complex category was established and familiar, the length of time to list its attributes was not significantly different from the length of time to list attributes of the constituents.

As in Experiment 1, the results of the second study showed a similar pattern in the relationship

of the constituent categories to the complex category.

Table 3. Experiment 1: Proportion of subject response to the total number of possible attributes.

	Category novelty:	
	novel	existent
Attribute type:		
category x attribute	.08	.06
category y attribute	.08	.07
joint x and y attribute	.33	.31

The pattern in the proportion of attributes from the various sources (i.e., from each constituent independently, from the constituents jointly, from neither constituent) for the existent complex category was replicated in this study. As in the first study, emergent properties were also found to be very important and to play a major role in complex category representation.

Another issue of interest addressed in the second study was the richness and predictiveness of the complex category compared to its simple constituents. The results of this experiment demonstrate that only when the complex category is novel and perhaps still in the formative stage is it less rich and predictive than the simple category. Once established and familiar, the complex category is, at least, just as predictive as the simple category.

Another finding consistent with the results of the first study was the perception by the subjects that the novel complex category was significantly more difficult to describe than the existent complex category and its constituent categories.

What do these results mean? Of interest in these studies was the nature of the representation of a complex social category based on information about multiple group memberships. In previous research, simple categorization has been the focus of interest. Even in cases of multiple group membership, researchers have argued that social perceivers access only simple categories at a time as the basis for their social judgments (Allen et al., 1983). The work on cross-categori-

zation (Deschamps & Doise, 1978; Commins & Lockwood, 1978; Vanbeselaere, 1987; Brewer et al., 1987), however, weakens this argument by demonstrating that perceivers can and do use integrated information about the multiple category memberships as the basis of their response.

Table 4. Experiment 1: Partition of attributes in the complex category taking into consideration category dominance.

	Category novelty:	
	novel	existent
Attribute type:		
dominant category attribute	.43[a]	.31[b]
non-dominant category attribute	.18[c]	.07[d]
joint attribute	.09[c]	.24[b]
emergent attribute	.28[b]	.38[a]

Note. Numbers are mean proportions of attributes of a particular type. Means with different superscripts differ significantly from one another (by the Scheffe post hoc comparison method).

The previous researchers discussed the weakening of category boundaries in crossed categorization (Arcuri, 1982) but failed to mention the possibility of changes in the featural representation of the amalgam category which may have affected or led to the redefinition of category boundaries. The contribution of the present research is a closer look at the nature of the category representation that is considered the foundation of these intergroup processes. This research looked at the complex category in terms of its featural representation and compared complex categories to its simple constituents. This research also tried to look into possible evolutionary aspects of complex categories.

The present research produced several results of interest. The data clearly showed a difference between novel and existent complex categories. The novel complex category was less rich and predictive (i.e., had fewer attributes listed), was perceived to be more difficult by subjects, and had longer list generation times than their constituent simple categories. The majority of the attributes listed to describe the novel complex

category were either attributes of the constituents alone or emergent properties.

The existent complex category, on the other hand, was just as rich and predictive, was perceived as being just as easy, and had list generation times of the same length as their constituent simple categories. The greatest proportion of attributes listed to describe the existent complex category were new and emergent properties.

The present research accomplished several things. First, it established that perceivers can and do have representations for complex social categories (or, at least, for compound categories as the target categories used in these experiments were) independent of their representations of the simple component categories. Given the multiple group memberships of target individuals, this suggests that it need not always be the case that social perceivers access only simple categories as the basis for their social judgments. It is possible that social perceivers form complex category representations of a target individual based on multiple group memberships. More research needs to be done, however, to identify the factors, both situational and dispositional, which may influence the development and use of these complex category representations.

There is sufficient evidence from both Experiments 1 and 2 to show that the complex category is a different entity from its components and that it is represented by a composite incorporating some elements of its constituents. There is also evidence indicating that the complex category is represented not just as a simple union or intersection of its constituents but is transformed into a new category with emergent features, attributes which do not come from its constituents.

What these experiments do not address, however, is how the constituent attributes are selected for inclusion in the complex category prototype. A logical next step in the research should address this issue. More work should also be done to test if the results of these experiments apply equally with an involved social perceiver who is a member of either one of the constituent

categories or of the complex category. The generalizability of the findings to categories other than the occupational categories we used should also be explored. In addition, more research should be done to find out what limits there are, if any, on the number of simple categories that can be integrated into a complex category.

The exact role of joint attributes in the complex category representation and how this role may differ in the novel versus existent complex category conditions is also an intriguing question. Is category overlap a necessary condition for complex categories to form?

Considering the overall picture, the research data provided strong evidence for an emergent model of complex categorization with elements of hierarchicality and conjunction. In both novel and existent category conditions, the proportion of emergent attributes was much higher than other attribute sources, the relative proportion of joint attributes included was very high, and attributes of the subject's dominant category were more likely to be included.

The evolutionary character of the representation of the complex category was less clearly demonstrated in the present research. The data on the content of the subject's representation of the complex category was found to be reflective of differential baserates, making it more difficult to isolate the effects due to category development. The cause of the baserate differences, however, is open to question and a case could be argued for complex category development from novel to familiar.

The novel complex category was also demonstrated to be less rich and predictive and was viewed as more difficult to describe than the existent category and its constituent categories. The existent complex category, on the other hand, appeared just as rich and predictive and as easy to describe as the simple categories. This equity with the simple category in terms of its predictiveness and ease of use plus the composite prototype representation is what makes the exis-

tent complex category a potentially powerful approach to changing stereotypes and social identities, and reducing intergroup discrimination.

It must be emphasized that the stimulus categories used in the study were initially structured to limit possible dominance effects. Noun-noun combinations joined by a conjunction were used to control for the possibility that one of the constituent categories would be selected by subjects as the dominant, "head concept." In addition, the constituent categories belonged to the same level of categorization, generally occupational groups. Nevertheless, the results of analysis exploring the dominance aspect indicated that categories may be viewed unequally by subjects and that one category may play a more dominant role in the complex category representation as posited by the hierarchical model.

This is not complete agreement, however, with Brewer's (1988) rigid stance in favor of the hierarchical model. According to Brewer, "social categories (person 'types') are nested within superordinate sets defined by partitionings along a few primary dimensions (p. 10)." The subtype, Brewer's closest version of the complex category, is never really independent of its dominant constituent under which it is typed. This research argues for other possibilities.

One such possibility is based on a more flexible approach to the question of how category dominance may affect complex category representation presented by Hampton (1987). He argued that the dominant constituent has a more dominant role in determining the attributes included in the representation of the complex category. Thus the complex category inherits more traits from the dominant constituent and the importance of an attribute to the complex category more closely resembles its importance to the dominant component. Hampton tested his hypotheses by having subjects rate the features of the complex category or of its constituents in terms of their importance to the concept. Dominance of the constituent categories had been

established in a prior research. His results supported his hypothesis on dominance. Hampton's work provides a possible paradigm for testing dominance effects in complex social categories in future research.

In addition, more work should be done to test if the results of these experiments apply equally with an involved social perceiver who is a member of either one of the constituent categories or of the complex category. More work should also be done to find out what limits there are, if any, on the number of simple categories that can be integrated into a complex category.

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