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Applying Individuation to Conflicting Social Categories

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Abstract:	The ability to differentiate individuals from their group memberships (individuation) is useful in forming impressions when social categorization fails to do so. This method is particularly valuable when encountering incongruent social category conjunctions (e.g., female bricklayer). We tested the notion that individuation is initiated when applying cognitively effortful explanatory, emergent attributes to incongruent conjunctions. Incongruent category conjunctions were more likely to be comprised of emergent attributes and individuation moderated the application of these attributes in Experiment 1. In Experiment 2, individuation again moderated emergent attribute application for incongruent conjunctions, but cognitive load attenuated the relationship. Allowing or preventing the generation of attributes did not affect individuation for incongruent conjunctions in Experiment 3. This ruled out the possibility that emergent attributes cause increased individuation, but does not rule out the notion that individuation precedes such explanatory attributes. Together these findings suggest that individuating those whose category memberships clash may be applied in the effortful application of explanatory emergent attributes.

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Abstract

The ability to differentiate individuals from their group memberships (individuation) is useful in forming impressions when social categorization fails to do so. This method is particularly valuable when encountering incongruent social category conjunctions (e.g., female bricklayer). We tested the notion that individuation is initiated when applying cognitively effortful explanatory, emergent attributes to incongruent conjunctions. Incongruent category conjunctions were more likely to be comprised of emergent attributes and individuation moderated the application of these attributes in Experiment 1. In Experiment 2, individuation again moderated emergent attribute application for incongruent conjunctions, but cognitive load attenuated the relationship. Allowing or preventing the generation of attributes did not affect individuation for incongruent conjunctions in Experiment 3. This ruled out the possibility that emergent attributes cause increased individuation, but does not rule out the notion that individuation precedes such explanatory attributes. Together these findings suggest that individuating those whose category memberships clash may be applied in the effortful application of explanatory emergent attributes.

Keywords: impression formation, categorization, social category conjunction, individuation, emergent attributes

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Applying Individuation to Conflicting Social Categories

We are often confronted with conflicting thoughts, from deciding whether to work late and catch up on a pressing assignment or attend to long overdue housework, to deciding if a job candidate's disparate qualifications are well suited to working as a lab assistant. Indeed, forming impressions of people we have not met before sometimes involves reconciling conflicting information, for instance a midwife that is male. In the current research, we investigate how people process and resolve conflicting information about social categories via individuation, and the consequences this has for the type of impression formed.

Forming Impressions of Unknown Others

We regularly meet strangers and these encounters are typically fleeting and superficial. Forming detailed impressions of every individual we meet would quickly overload our cognitive capacity. Accordingly, we tend to base impressions on stored representations of social categories such as occupation or gender (e.g., Macrae & Bodenhausen, 2000). For example, on meeting a nurse and activating the associated stored category, we may assume that this individual is caring, dedicated, and hardworking, with good people skills. This process of social categorization simplifies the task of impression formation, providing an efficient mechanism for dealing with our complex social world (Macrae & Bodenhausen, 2001). For the most part, this system works smoothly and efficiently, including when we have to process social categories simultaneously.

Social category conjunction broadly refers to the construction and representation of a complex social category from two simple constituent categories (e.g., Ensari & Miller, 1998). Much of the time, categories combine in compatible, familiar ways. For example, the category 'female' is largely typical of the category 'nurse'. Indeed, female registered nurses outnumber male registered nurses by 15 to 1 in the US (National Sample Survey of Registered Nurses, 2008).

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The compatibility of social category conjunctions have important implications for the application of mechanisms used to gain impressions and the cognitive effort involved. This forms the focus of the current program of research. We take a novel approach to investigate what happens when perceivers encounter incongruent conjunctions, relative to congruent conjunctions. Specifically, we focus on impressions formed for conjunctions dependent on the moderating role of individuation (differentiating people at a trait level), in triggering cognitively effortful inconsistency resolution.

Conflicting Social Category Conjunctions

Two potential outcomes are possible when forming impressions of social category conjunctions. On the one hand, the perceiver might activate *constituent* attributes. These are attributes accessed from information held in long-term memory about the two categories. On the other hand, *emergent* attributes (new attributes not present when considering the two constituents in isolation from one another) may be activated. Hutter and Crisp (2005) conducted a series of studies investigating impressions formed when perceiving incongruent conjunctions, relative to congruent conjunctions. Conflicting conjunctions resulted in a greater proportion of emergent traits versus constituent traits (relative to congruent conjunctions). Why are emergent attributes applied in such cases?

Individuation and Social Category Conjunction

There are two distinct processing stages in Hastie, Schroeder, and Weber (1990) two stage model leading to emergent attribute application. Perceivers first attempt to fit the target to a simple categorical frame. Impressions are often formed for congruent conjunctions (e.g., 'female nurse'), by simply averaging attributes that co-occur for the two constituents. When encountering an incongruent conjunction like a 'female construction worker', however, averaging is less helpful because some attributes may contradict one another. This activates a second *complex reasoning* stage to resolve the inconsistency. Therefore, social perceivers do

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not *immediately* generate emergent attributes when encountering an incongruent conjunction. This contrasts with Kunda, Miller and Claire's (1990) instant application of emergent attribute approach. However, Siebler (2008) found evidence for only Hastie et al.'s perspective.

Fiske and Neuberg's (1990) continuum model may also be useful in furthering our understanding of the perception of social category conjunctions. According to this account, a continuum runs from heuristic category-based impressions to more systematic, attribute-based individuated impressions. Perceivers initially try to form an impression by searching memory for a stored social category matching the person encountered. If this category search succeeds the target is attributed the characteristics associated with the category (much like Hastie et al.'s model). If categorization is unsuccessful however, there is a shift towards piecemeal attribute-by-attribute impressions. Individuation may occur in other ways: Fiske, Lin, and Neuberg (1999) discuss *naive theories*, whereby perceivers gain coherence for combinations of attributes through recourse to *reasoning* to resolve perceptual conflict (e.g., Kunda et al., 1990). Naïve theorizing approximates to Hastie et al.'s second stage complex reasoning. Complex reasoning is a form of individuation and the resulting emergent attributes make for coherent impressions (Hastie et al., 1990).

Whether or not perceivers apply emergent attributes should be contingent upon the *degree* to which they first individuate a target. Individuation should therefore occur before emergent attribute application. Piecemeal integration and naïve theorizing/complex reasoning are likely to be recruited when establishing how a person came to share membership of two conflicting categories. In the current paper, we harness *both the continuum and two stage* models in order to test our prediction that individuation moderates the production of emergent attributes for incongruent social category conjunctions.

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The Current Research

Individuation can rely on one of two routes: an attribute–by-attribute piecemeal approach, or through naïve theorizing (complex reasoning). We endeavor to show that individuation, moderates impressions formed of incongruent conjunctions. Specifically, we aim to show that the activation of individuation resulting in emergent attribute application occurs only for incongruent conjunctions.

Hypotheses. We anticipate that the degree of individuation will moderate the generation of emergent attributes for incongruent conjunctions. Information drawn from constituent categories does not fully explain why people may belong to two disparate categories. Individuation is effortful (Fiske, Lin, & Neuberg, 1999), and therefore should moderate the application of emergent attributes for incongruent conjunctions. We also expect that restricting the generation of (emergent) attributes, following exposure to the category conjunction, will result in no change in rated individuation. This is will be so because, we believe, emergent attribute generation does not moderate individuation.

Pilot study 1

A pilot study enabled the selection of two incongruent and two congruent category conjunctions for use in Experiments 1, 2, and 3. We aimed to ensure that less familiarity and greater surprise characterized the incongruent conjunctions relative to the congruent conjunctions, while ensuring intergroup attitude was similar to rule out potential attitudinal confounds. Thirty participants (26 women, mean age = 21.43 years. All identified themselves as British and English as their first language) rated four category conjunctions (a female bricklayer vs. a male bricklayer, and a male nurse vs. female nurse) on three measures: "how familiar is the type of person described above?", (*1 = not at all familiar; 7 = very familiar*); "how surprised would you be to meet the type of person described above?", (*1 = not at all surprised; 7 = very surprised*); and a feeling thermometer to indicate their

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attitude toward the described person (Haddock, Zanna, & Esses, 1993; *0 = extremely unfavorable; 100 = extremely favorable*). The two collapsed incongruent conjunctions (female bricklayer & male nurse) were rated as significantly more surprising ($M = 4.02$; $SD = 1.33$ vs. $M = 1.59$; $SD = 0.90$, $t(29) = 9.44$, $p < .001$) and less familiar ($M = 3.09$; $SD = 1.28$ vs. $M = 5.66$; $SD = 1.36$, $t(29) = -7.56$, $p < .001$) than the two collapsed congruent conjunctions (male bricklayer & female nurse), but did not differ significantly in attitudes measured by the feeling thermometer, $t(29) = -0.53$, $p = .60$.

Experiment 1

In this experiment, we tested whether generating more emergent attributes in descriptions of incongruent vs. congruent social category conjunctions is dependent on viewing these persons in an individuated manner. Participants listed as many traits as they could to describe one of two incongruent conjunctions and its constituents, or one of two congruent conjunctions and its constituents, using similar methodology to previous work undertaken in the study of complex social conjunctions (e.g., Hastie et al., 1990; Hutter & Crisp, 2005; 2006; Kunda et al., 1990). Our goal was to provide initial evidence that individuation generally plays a role in perceiving category conjunctions.

Method.

Participants and design. Eighty-two undergraduate participants (62 women, mean age = 22.76 years (all identified themselves as British and English as their first language) were randomly allocated to a one factor (Conjunction) between subjects design with two levels (congruent vs. incongruent). Individuation was also included as a continuous potential moderating variable. Recruitment of participants occurred via the departmental research participation scheme in exchange for £5 (approximately $8). There were four gender-occupation conjunctions in total. The two congruent conjunctions were a 'male bricklayer'

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and a 'female nurse', and the two incongruent conjunctions were a 'female bricklayer' and a 'male nurse'.

Procedure. The experimenter informed participants that they would be participating in a study investigating impression formation. Each participant first completed a trait generation task in which they were required to list as many traits as they could to describe each of three people that appeared in randomized order on the computer screen. Each participant described either a congruent *or* an incongruent conjunction and its respective two constituent categories. For each of the three trials, participants saw the relevant category label on the computer screen, and had two minutes to generate as many descriptive characteristics as they could, by typing them into the computer. This closely followed the procedure described by Hastie et al. (1990). Second, participants completed a measure of 'individuation', in which they rated the degree to which they viewed each of the previously described persons in terms of individual vs. group membership affiliations.[1] Participants then completed a measure of rated surprise and familiarity for each person described, before the experimenter thanked and debriefed them. Our method ensured participants were clear what the referred to group(s) were for each scale, without explicit reference to the relevant group (thus avoiding demand characteristics), because participants rated both constituents and conjunctions in the task.

Dependent measures. The main dependent measures were the number of emergent attributes (attributes listed for a conjunction that are independent of the constituent categories) and constituent attributes (attributes generated for both the combined category and the constituent categories) used to describe category conjunctions. We also took three additional Likert scale measures: Surprise, "How surprised would you be to meet the type of person described above?" (*1 = not at all surprised, 7 = very surprised*); familiarity, "How familiar is the type of person described above?" (*1 = not at all familiar, 7 = very familiar*);

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and individuation, "How much did you view the person described above as..." (*1 = an individual, 7 = a group member*).

Results and discussion.

Perceptions of conjunctions. The two incongruent conjunctions were rated as more surprising ($M = 4.20$; $SD = 1.62$) than the two congruent conjunctions ($M = 2.49$; $SD = 1.29$), $t(80) = 5.29$, $p < .001$. Additionally, the two incongruent conjunctions were rated as less familiar ($M = 1.83$; $SD = 0.95$) than the two congruent conjunctions ($M = 3.41$; $SD = 1.48$), $t(80) = -5.77$, $p < .001$.

Coding. To calculate the number of emergent and constituent attributes generated for combined categories we used a procedure derived from Hastie et al. (1990). We defined attributes used only when describing category conjunctions as emergent and attributes common to both a category conjunction and its constituents as constituent. Two independent coders first screened within-participant response sets for synonyms (using a dictionary and the synonym and thesaurus functions in Microsoft Word) counting these once only. For example, coding of 'happy' and 'chirpy' resulted in both being recoded as 'happy', with 'chirpy' removed from the dataset accordingly. Next, the coders classified attributes generated by participants as either 'emergent' or 'constituent' according to the criteria above, and calculated the total number of emergent attributes and the total number of constituent attributes generated by each participant. The coders worked alone to a careful procedure to eliminate synonyms, resulting in a minimal number of inconsistencies between coders. The number of emergent and constituent attributes generated across coders was compared using a Pearson's correlation for each participant resulting in acceptable inter-rater agreement for *emergent attributes*, $r = .70$ and for *constituent attributes*, $r = .93$. This confirmed that the number of inconsistencies across the two coders was minimal. We then took the average score across coders for each type of attribute to form a single index reflecting the number of

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emergent attributes generated and a single index reflecting the number of constituent attributes generated.

Attributes generated. We investigated the moderating effects of individuation on emergent attribute and constituent attribute generation for congruent and incongruent conjunctions using a moderated regression analysis (Aiken & West, 1991). We first computed an interaction variable by contrast coding conjunction level as -1 and 1 (incongruent vs. congruent) and then multiplied this by the centered continuous individuation scores for each participant. Next, we entered the conjunction × individuation interaction variable into a multiple regression on a second step following the insertion of the conjunction and individuation independently at Step 1. Calculation of the regression on the generation of emergent and constituent attributes followed, allowing us to model the requisite conjunction × individuation interaction.

- Figure 1 about here-

This analysis revealed a marginal effect of conjunction on emergent attribute generation at Step 1, $\beta = -.17$, $p = .08$[2]. However, greater individuation resulted in significantly greater application of emergent attributes $\beta = -.27$, $p = .01$. This was qualified by a significant conjunction × individuation interaction, $\beta = .24$, $p = .02$, ΔR-squared = .043 (see Figure 1). The effect was unpacked using independent simple regressions for congruent and incongruent conjunctions. The congruent conjunctions showed no effect of individuation, $\beta = -.053$, $p > .05$. In contrast, for incongruent conjunctions, greater individuation moderated emergent attribute use, $\beta = -.51$, $p < .001$. Furthermore, this observed conjunction × individuation interactive effect was not found on the generation of constituent attributes, $\beta = -.053$, $p > .05$, clearly showing that the latter form of attributes vary less in impression formation as a function of conjunction type (see Table 1 for means and standard deviations across all variables).

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- Table 1 about here-

The results of Experiment 1 lend some support to the idea that greater individuation moderates emergent attribute generation in perceptions of incongruent, but not congruent conjunctions. It is clear that the poor fit between the constituents in incongruent conjunctions results in emergent traits and these properties arise when individuation is high. Our findings therefore clearly show that the use of emergent traits is related to the degree to which perceivers individuate – in keeping with both Hastie et al.'s (1990) and Fiske Neubergs's (1990) models respectively. We next explore if applying emergent attributes following individuation requires cognitive effort.

Pilot study 2

In Experiment 1, we used a single item measure of individuation. We developed a more comprehensive multi-item measure for use in Experiment 2 (and Experiment 3) to ensure our new multi-item measure was a reliable and valid measure[3].

One-hundred and sixty-two participants (138 women, mean age = 19.87 years. All identified themselves as British and English as their first language), rated four category conjunctions, defined by congruence (an Asian mechanic vs. a White mechanic, and an Asian tandoori restaurant owner vs. a White tandoori restaurant owner) for familiarity and surprise[4]. The same familiarity and surprise measures as Pilot 1 were incorporated. The two collapsed incongruent conjunctions (Asian mechanic and White tandoori restaurant owner) were considered to be more surprising (M = 3.81; SD = 1.61) than the two congruent conjunctions (White mechanic and Asian tandoori restaurant owner) (M = 2.19; SD = 1.41), t (160) = 6.88, p < .001. Furthermore, the two incongruent conjunctions were perceived as less familiar (M = 1.57; SD = 0.90) than the two congruent conjunctions (M = 3.22; SD = 1.58), t (160) = -8.20, p < .001.

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The conjunctions were further rated on five items designed to measure individuation: The single item, used in Experiment 1, plus four new items: "On first meeting the person described above, I would most likely think of them as an...", (*1 = an individual; 7 = a group member*); "To what extent do you think of the person described above as a unique individual?", (*1 = not at all; 7 = very much*); "To what extent does the type of person described above qualify as a group member?", (*1 = not at all; 7 = very much*); "How similar are individual members of the above group to other members of the same group?", (*1 = not at all similar; 7 = very similar*). The second item was reverse coded. The five items produced a single collapsed average individuation index for each participant. On completion of the five-item individuation scale, participants undertook a 12-item measure of Personal Need for Structure (PNS) scale (Neuberg & Newsom, 1993; Thompson, Naccarato, & Parker, 1989). High PNS is associated with a more ordered categorical processing style (Bartal & Guinote, 2002). Therefore, if the individuation scale is a valid measure of individuation then a positive relationship should exist with PNS.

Analysis revealed that reliability for our full five-item individuation scale was acceptable $\alpha = .76$. In addition, as predicted, the individuation index was positively correlated with PNS scores, $r = .28$, $p = .0065$, when rating incongruent conjunctions. However, when rating congruent conjunctions, there was no significant correlation between individuation and PNS $r = .04$, $p > .05$. These results suggest that convergent and content validity for our new individuation measure was met.

Experiment 2

In Experiment 2 we predicted differential levels of individuation would lead to the greater application of emergent attributes when describing incongruent conjunctions (as in Experiment 1) and that cognitive load would disrupt this. We also predicted that this disruption would not occur for constituent attributes: previous research has demonstrated

that the generation of constituent attributes is not (or is less) cognitively taxing (Hutter & Crisp, 2006). In sum, we aimed to show that differential individuation for incongruent conjunctions moderates the use of emergent attributes, as observed in Experiment 1, and that this is a deliberative process requiring cognitive resources. This would unequivocally demonstrate the importance of cognitive resources in the application of emergent attributes for perceivers that individuate highly.

Method.

Participants and design. One hundred and fifty-seven undergraduate participants (105 women, mean age = 21.04 years (all identified themselves as British and English as their first language) were randomly allocated to a 2 (Conjunction: incongruent vs. congruent) × 2 (Cognitive Load: high vs. low) between subjects design. Individuation was also again included as a continuous moderating variable. Participants enrolled for the experiment via the departmental research participation scheme in exchange for £5 (approximately $8). Testing comprised the same four gender-occupation conjunctions as in Experiment 1.

Procedure. The experimenter informed each participant that the study concerned impression formation. Participants completed the same trait generation task as Experiment 1, describing the same three categories (one conjunction and its two constituents) in random order. In the high cognitive load condition, participants undertook a random number generation task (Baddeley, 1966), while concurrently completing the trait generation task for the conjunction only. Participants received the instruction: "While completing the trait listing task please say aloud a number between 1 and 5 every second. Do not repeat the number consecutively." In the low cognitive load condition participants did not receive this instruction. Participants also completed a measure of individuation for each category (see Pilot 2 for a list of the items used). Finally, participants completed a measure of surprise and

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familiarity for each person described, before the experimenter thanked and debriefed each participant.

Dependent measures. The main dependent measures were the number of emergent attributes and the number of constituent attributes. The experimenter administered the same measures of surprise and familiarity as Experiment 1. The individuation measure consisted of the five items listed in Pilot 2. Reliability for the five-item was identical to Pilot 2, $\alpha = .76$.

Results and discussion.

Perceptions of conjunctions. As in Experiment 1, the incongruent conjunctions were rated as significantly more surprising ($M = 4.12$; $SD = 1.55$) and less familiar ($M = 1.87$; $SD = 1.32$) than the congruent conjunctions ($M's = 2.19$ & 3.70; $SD's = 1.92$ & 1.74), $t\,(155) = 8.47$, $p < .001$ and $t\,(155) = -7.81$, $p < .001$.

Coding. Two coders followed the same procedure used in Experiment 1 for defining the number of emergent versus constituent attributes for combined categories. The number of *emergent attributes* was characterized by good inter-rater agreement, $r = .81$ across Coders 1 and 2. The number of *constituent attributes* generated for each participant also resulted in a high level of inter-rater agreement, $r = .96$.

Attributes generated. We were interested in the moderating effects of individuation on emergent and constituent attribute generation across category conjunction while under cognitive load, and so applied a moderated regression analysis (Aiken & West, 1991) as in Experiment 1. We computed four interaction variables to investigate these effects. First, we contrast coded conjunction level as -1 and 1 (incongruent vs. congruent) and cognitive load as -1 and 1 (high load vs. low load). Second, we centered our collapsed continuous individuation index in to a standardized score for each participant. Third, we multiplied conjunction by cognitive load, conjunction by individuation, and cognitive load by

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individuation to create the requisite interaction terms. Fourth, we multiplied conjunction by cognitive load by the centered continuous scores for individuation to create a three-way interaction term. At Step 1, we entered conjunction, cognitive load, and individuation factors independently into a multiple regression. We next added the three two-way interaction terms into a multiple regression on a second step. At Step 3, we entered the three-way conjunction × cognitive load × individuation interaction term. The three-way interaction term was regressed on the generation of emergent attributes and constituent attributes independently, allowing us to model in particular the hypothesized effect that was of most interest here.

- Figure 2 about here-

This analysis revealed no main effects for any of the independent variables on emergent attribute generation at Step 1. Step 2 revealed no interactive effects for conjunction by cognitive load or cognitive load by individuation. A significant conjunction × individuation interaction was found, $\beta = .29$, $p = .027$. However, this was qualified at Step 3 by a significant conjunction × cognitive load × individuation interaction, $\beta = -.83$, $p = .030$, ΔR-squared = .028. We decomposed this by conducting separate simple regressions for incongruent and congruent conjunctions on the cognitive load × individuation interaction. The congruent conjunctions showed a non-significant cognitive load × individuation effect, $\beta = .10$, $p = .585$, while a significant effect was found for the incongruent conjunctions, $\beta = .33$, $p = .013$. The significant load × individuation interaction for the incongruent conjunctions was further decomposed, by regressing emergent attributes on to the individuation factor independently for high and low load conditions. This resulted in a significant effect under low load, $\beta = -.43$, $p = .003$, whereby greater emergent application resulted from greater individuation, but not under high load, $\beta = .05$, $p > .05$ (see Figure 2). These findings support the idea that differential individuation in the perception of

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incongruent conjunctions moderates the application of emergent attributes [5]. Furthermore, restricting cognitive resources reduced the ability to create individuated impressions leading to emergent attribute application, confirming that this process is cognitively taxing. There were no interactive effects (or other effects) observed for conjunction × cognitive load × individuation on the generation of constituent attributes, $\beta = .05$, $p > .05$, suggesting that variation in forming impressions across conjunction type is not driven by these type of attributes (see Table 2 for means and standard deviations across all variables). We next aimed to secure more clearly the relationship between individuation and emergent attribute application.

- Table 2 about here-

Experiment 3

In Experiments 1 and 2, we showed that individuation moderates the application of emergent attributes for incongruent category conjunctions. However, the direction of this relationship remains unclear. That is, while the premise that individuation moderates and results in the production of emergent attributes underpins our hypothesized conceptual relationship it is also possible that generating novel attributes results in a more individuated impression formed (i.e., generating emergent attributes causes a move from categorical to individuated impressions). Experiments 1 and 2 do not allow us to categorically state that emergent attribute generation does not lead to individuation. Methodological constraints did not permit measurement of individuation *before* the generation task (see method sections Experiment 1 & 2). To test the competing account, that applying emergent attributes might increase individuation for incongruent conjunctions, we manipulated the generation of emergent traits *before* measuring individuation *using incongruent conjunctions only*. We treated individuation as the main dependent variable in this experiment. If attribute generation affects individuation an increase in rated individuation will be observed for

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participants allowed to freely generate emergent attributes. In addition, participants exposed to the category conjunction, but not free to generate attributes, will not show an increase in individuation. We also tested the application of emergent and constituent attributes when describing incongruent social category conjunctions (attribute generation condition only), in accord with Experiments 1 and 2.

Method.

Participants and design. Eighty undergraduate participants (74 women, mean age = 20.55 years. All identified themselves as British and English as their first language) were randomly allocated to a one factor (attribute generation) between subjects design with two levels (attribute generation vs. non-attribute generation). Participants received £5 (approximately $8) following enrollment via the departmental research participation scheme. We used the same two incongruent gender-occupation conjunctions as in Experiments 1 and 2.

Procedure. The experimenter explained to each participant that the study was concerned with impression formation. Participants were randomly allocated, in equal numbers, to either an attribute generation condition or a non-attribute generation condition. Participants in both conditions were instructed *"In a moment, you will be asked to think about the following type of person: [Constituent category A - Constituent category B]"*. For example, participants might be required to think about a female bricklayer. In the attribute generation condition participants' then completed the same generation task used in Experiments 1 and 2, in which they describe three categories (one conjunction and its two constituents) presented in random order. In the non-attribute generation condition participants received an alternative instruction involving a word search task. Each participant completed three such word searches with two minutes allocated per word search task. As a result participants in the non-attribute generation condition did not generate attributes for

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constituent or combined categories, but did encounter the category labels. *All* participants then rated each constituent and conjunction using the same five-item individuation measure administered in Experiment 2 and rated each person described on measures of surprise and familiarity before the experimenter thanked and debriefed them.

Dependent measures. The main dependent measure of interest was individuation as measured using the five-item individuation measure outlined in Pilot 2 and Experiment 2. The 5-item individuation scale was again found to be reliable, $\alpha = .77$. The same measures of surprise and familiarity as used in Experiments 1 and 2 formed secondary dependent variables. Additionally, we measured the number of emergent attributes and the number of constituent attributes generated (attribute generation condition only).

Results and discussion.

Perceptions of conjunctions. Rated individuation did not differ across attribute generation and non-attribute generation conditions $t(78) = 1.10$, $p > .05$. There was no observed difference for attribute generation and non-attribute generation conditions in rated surprise $t(78) = -1.50$, $p > .05$, or familiarity $t(78) = 0.74$, $p > .05$. These results are not consistent with the premise that generating (novel) attributes causes greater individuation. Instead, participants individuated incongruent category conjunctions to the same degree whether preceded by the generation task or not. The results are consistent with our account arguing that emergent attribute application does not lead to increased individuation. However, in order to ensure that our findings are convincing we next aimed to demonstrate that the trait application effects observed in Experiments 1 and 2 (i.e. where greater individuation seemingly led to the application of more emergent attributes), were observable for incongruent category conjunctions in the attribute-generation condition.

Coding. Definition of the number of emergent versus constituent attributes for combined categories followed the same procedure outlined in Experiments 1 and 2 using two

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coders. High inter-rater agreement was achieved for the number of *emergent attributes*, r = .80 across Coders 1 and 2. Inter-rater agreement across coders 1 and 2 also met a high level of agreement for the number of *constituent attributes*, r = .90.

- Figure 3 about here-

Attributes generated. We tested the effects of individuation on emergent and constituent attribute generation. However, this was only applicable in the attribute-generation condition of Experiment 3. First, we collapsed our individuation items to create a continuous individuation index and then centered this new variable in to a standardized score for each participant. Second, we centered our emergent attributes variable in to a standardized score for each participant. We next conducted separate simple regressions for the individuation factor independently for emergent and constituent attributes. This resulted in a significant effect, β = -.37, p = .03, in which greater emergent attribute application was moderated by greater individuation (see Figure 3). Reduced constituent attribute application was moderated by reduced individuation, β = .36, p = .036 (see Table 3 for means and standard deviations across all variables)[6].

- Table 3 about here-

Together, these findings show that emergent attribute generation does not lead to elevated individuation. These results do not concur with the notion that applying emergent attributes is causal in individuated impressions. Participants individuated the incongruent conjunctions to same degree regardless of whether given an opportunity to apply attributes or not. Alternatively, the results are consistent with (although do not directly show) the idea that individuation precedes emergent attribute generation. This final point remains to be tested.

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General Discussion

Across the first two experiments we showed that perceiving incongruent category conjunctions, when individuated, resulted in the application of emergent attributes. In Experiment 1, greater individuation when describing incongruent conjunctions led to increased application of emergent but not constituent attributes, whereas congruent conjunctions did not show this effect. In Experiment 2, individuation again moderated the effect of category conjunction. That is, while individuation moderated the greater application of emergent attributes in the incongruent condition this was less likely in the congruent condition. Moreover, greater individuation resulted in more emergent attribute application by those allocated to low cognitive load but not those in the high cognitive load condition. In Experiment 3, we tested a competing account that the generation of (novel) attributes leads to greater individuation. Experiment 3 ruled out the idea that generation of attributes drives individuation. These findings have a number of important implications for theory and research into how we resolve conflicting category information when forming impressions of others.

Individuation and incongruent conjunction perception. Our findings offer evidence of emergent attribute application moderated by individuation when forming impressions of incongruent category conjunctions in accord with Fiske and Neuberg's (1990) continuum model. When people encounter a congruent conjunction they are able to form impressions drawing on stored categorical knowledge. Indeed, categorical thinking works well as a timesaving cognitive shortcut (Fiske & Taylor, 1991). For example, it is easy to form an impression of a 'male bricklayer'. Incongruent conjunctions require a different approach and social perceivers who individuate apply more emergent attributes. This facilitates understanding of how one person could belong to two apparently conflicting categories. Indeed, when describing the female bricklayer those who individuated highly

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were more likely to later apply emergent attributes including, 'unusual', 'non-conformist', and 'unconventional'. The nature of these traits suggests to us that they are applied *following* conflict resolution as a means to *explain* why and how such a person came to share these unusual memberships thereby smoothing coherence.

Although these example emergent traits suggest potential parallels with individuation emergent attributes and individuation are distinct constructs. Indeed, other more diverse emergent traits were observed that did not obviously stem from a perception of the target individual as violating the requirements for group membership. For example, other emergent attributes applied for female bricklayer included 'feisty' and for male nurse 'mentally strong'. Further evidence that emergent attributes and individuation are independent constructs came from the observation that some participants individuated congruent targets but generated very few emergent attributes (see Figure 1). We believe in these cases, although participants saw the target person as an individual, there was nothing that required explaining about their category memberships. It is possible that there are individual differences underlying this, for instance some people tend to lean towards individualistic impressions of others. Individualistic impressions are likely to occur for some perceivers regardless of whether targets are congruent or incongruent in nature without the application of emergent attributes for congruent conjunctions because there is little to resolve in terms of category membership. Our examples suggest that people, in accord with Asch and Zukier (1984), have the ability to form overall impressions or *gestalts* even when traits conflict (e.g., sociable and lonely), by relying on their own understanding about cause and inference amongst traits.

Many people perceive incongruent category conjunctions through the production of emergent attributes following individuation, according to our findings. The importance of considering emergent attributes when studying impression formation is clear, as to date these

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perceptual features have been somewhat neglected in social psychology, relative to cognitive psychology, for example (e.g., Hampton, 1996). Emergent attributes smooth impression formation when attempting to reconcile conflicting categories probably following individuation – a crucial perceptual tool.

Perceiving congruent and incongruent conjunctions. Our findings also provide evidence that cognitive load attenuates the use of emergent attributes. This complements and extends Hutter and Crisp's (2006) finding that cognitive load reduces the production of emergent attributes when thinking about incongruent conjunctions in several ways. First, Hutter and Crisp tested only a single category conjunction (an Oxford educated bricklayer), while we tested two incongruent conjunctions. Second, we tested both congruent and incongruent conjunctions, clearly establishing that cognitive resources are important *only* for incongruent conjunctions. Third, and perhaps most significantly, our work shows that cognitive load attenuates the use of emergent attributes when individuating incongruent conjunctions. Therefore, higher individuation only results in greater emergent attribute application when there are sufficient cognitive resources.

We further found that under optimum processing conditions, when cognitive resources are available, greater individuation results in an increase in the application of emergent attributes to incongruent conjunctions. What are the inter-relationships amongst these factors and what does this infer? First, incongruent conjunctions result in emergent attribute application, using complex reasoning (Hastie et al., 1990). Second, cognitive resources are required in the application of emergent attributes. Restricting cognitive resources breaks the causal chain, undermining explanatory emergent attributes (Hutter & Crisp, 2006). Third, the present work established a role for individuation in the application of emergent attributes when accounting for novel category conjunctions. It is clear that: a) restricting cognitive resources reduces individuation and emergent attribute application and

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b) as shown in Experiment 3, generating attributes does not itself lead to individuation. This leaves the possibility that a relationship exists whereby individuation is causal in the production of emergent attributes. Although, we did not directly test a directional link from individuation resulting in emergent attributes. However, we believe that this is likely to be the case and if found in future work, could be an important factor in determining why social conjunctions are a richer source of emergence over natural conjunctions (Hampton, 1997), where individuation is impossible.

A possible shortcoming with Experiment 3 is that although participants were not free to list attributes in the non-attribute condition they may have thought of them nonetheless. However, we believe this is very unlikely given that the generation task in the non-attribute generation condition was replaced with a filler task – a word search. Without an instruction to generate attributes, participants are unlikely to have been motivated to do so – which would have involved considerable cognitive effort while completing the word search. Furthermore, data from Experiment 2 showed that restricting cognitive resources for incongruent conjunctions did not affect individuation (see footnote 4), bolstering the findings of Experiment 3. Additional support for our perspective comes from recent research showing that *mere perception* of stereotype-violating conjunctions does not lead to effortful processing (Quadflieg et al., 2011).

Arguably, another potential shortcoming lays in our use of a self-report measure of individuation. Self-report measures are widely used in social psychology and if carefully applied can offer valuable insight to the construct of interest. Well-documented disadvantages are associated with this form of measure and include social desirability. However, given the high association between our individuation scale and PNS (a measure unlikely to elicit social desirability) in Pilot 2, we believe that the individuation scale reliably and validly measured the construct with minimal confound.

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Implications for models of individuation and social category conjunction.

Applying emergent attributes to incongruent category conjunctions, following individuation offers a means to gain a coherent impression of those who share conflicting categorical memberships. Hutter et al. (2009) found that the initial stage of impression formation for congruent *and* incongruent category conjunctions is characterized by greater application of constituent over emergent traits. Indeed, constituent traits are less effortful than emergent traits (Hutter & Crisp, 2006). However, in the second stage only congruent category conjunctions continued to show this pattern, while incongruent category conjunctions were characterized by relatively greater application of effortful emergent traits. Taken together with the present findings, this suggests that consistent with Hastie et al.'s (1990) two-stage model, and Fiske and Neuberg's (1990) continuum model impression formation relies initially on application of categorical frames when encountering congruent conjunctions. However, following this initial stage in Hastie et al.'s model (or moving across the continuum in Fiske and Neuberg's model) there follows a second stage involving complex reasoning. Our findings clearly build on this in showing that individuation and the application of emergent traits rely closely on one another. Emergent traits are not causal in individuation themselves, but are more likely to be the product of this – although the latter remains to be fully tested.

Conclusions

Across three studies, we investigated how social category conjunctions varying in congruence are differentially processed and the consequences this has for the type of impression formed. In Experiment 1, descriptions of incongruent social category conjunctions were comprised more of emergent attributes moderated by individuation. Emergent descriptions of incongruent conjunctions were again moderated by individuation in Experiment 2. Cognitive load compromised the moderation of emergent attributes by

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individuation. Perceivers found it difficult to individuate their impressions, which in turn left them less able explain the conflict using emergent attributes for incongruent conjunctions. A competing idea - that attribute generation leads to individuation was ruled out in Experiment 3. Together, these findings suggest that resolving incongruent conjunctions by individuation relies on cognitive resources, resulting in emergence. These findings further suggest that both Hastie et al.'s (1990) two-stage model, and Fiske and Neuberg's (1990) continuum model are complimentary in explaining how people resolve inconsistency when encountering conflicting constituent categories. We are motivated to explain inconsistency in others. It is clear that emergent attribute generation does not lead to individuation, but the possibility remains that individuation results in emergent attribute application. Although cognitively draining, the application of these attributes restores coherence to our social world.

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Footnotes

[1]It is essential that the generation task immediately follows presentation of a conjunction to avoid potential confound through the measurement of other variables. This is in accord with previous research (e.g., Hastie et al., 1990; Kunda et al., 1990). Therefore, it was not possible to present the individuation measure before the generation task as is normally desirable in moderated regression. However, see Experiment 3 for a solution to this problem.

[2] However, it is interesting to report that more emergent attributes were applied to the incongruent conjunctions (M = 1.48) versus the congruent conjunctions (M = 0.82). In Experiment 2, again more emergent attributes were applied to the incongruent conjunctions (M = 0.91) versus the congruent conjunctions (M = 0.51) at a significant level, β = -.21, p = .035.

[3]It is necessary that we include a measure that taps multiple individuation strategies (i.e. piecemeal integration and naïve theorizing) because individuation has often been indirectly inferred as a reduction in categorization using measures such as Personal Need for Structure (PNS). However, reduced categorization is not *necessarily* negatively associated with individuation under conditions of naive theorizing because it is clear from previous research that this process can also be reliant on categorical information stored in the constituent categories (e.g., Kunda et al., 1999). Consequently, a measure encompassing both piecemeal and naïve theorizing best suits our purpose. There are no extant measures of individuation in the form of naive theorizing. However, while we are interested in the processes (piecemeal integration and naive theorizing), through which individuation is arrived at, we are more focussed on the outcome – individuation itself, which is similar in both forms. We validated our measure against PNS: We acknowledge PNS does not provide an ideal method of

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validation (relying more on reduced categorization). However, given the lack of extant piecemeal and naïve theorizing measures of individuation we tested validity in this way.

[4]We used race based category conjunctions to allow a full test of the range of responses on the individuation measure. Reduced variability might be expected when using high numbers of participants sharing the same category (sex) with targets.

[5]Meyers-Levy and Sternthal (1991) found that women process information more comprehensively and elaborate on this more readily whereas men rely to a greater degree on heuristics. Although our data sets comprised relatively low numbers of men we collapsed and analyzed data across Experiments' 1 and 2 (resulting in men $n = 43$ and women $n = 118$). However, only the low load data was analyzed from Experiment 2. Participants rated only incongruent conjunctions in Experiment 3, therefore this data was not included. In order to test Meyers-Levy and Sternthal's (1991) findings in the present work we conducted a one factor (Conjunction) between subjects moderated regression analysis, with individuation as the moderating variable (i.e. we analyzed the factors common to Experiments 1 and 2). The main dependent variables were emergent and constituent attributes generated. Rated surprise and familiarity were also analyzed. Based on Meyers-Levy and Sternthal's (1991) findings, we might expect women to individuate to a higher degree and subsequently apply more emergent attributes and fewer constituent attributes particularly for incongruent conjunctions relative to men. In addition, we would also expect men to individuate less, apply fewer emergent attributes, and use more attributes derived though heuristic processing (i.e. constituent attributes). The incongruent conjunctions ($M = 4.27$; $SD = 1.58$) were rated as significantly more surprising than the congruent conjunctions ($M = 2.36$; $SD = 1.35$) by women, $t\ (116) = 7.00$, $p < .001$, and men (incongruent conjunctions $M = 4.06$; $SD = 1.63$; congruent conjunctions $M = 2.36$; $SD = 1.32$), $t\ (41) = 3.91$, $p = .000341$. Furthermore, the incongruent conjunctions ($M = 1.87$; $SD = .92$) were considered less familiar than the

congruent conjunctions (M = 3.49; SD = 1.63) by women, t (116) = -6.60, p < .001, and men (incongruent conjunctions M = 1.78; SD = .88; congruent conjunctions M = 3.32; SD = 1.44), t (41) = -4.04, p = .000229. Analysis of the main variables on emergent attributes revealed only one main effect, that of individuation β = -.27, p = .006 for women, but not men, β = -.19, p = .465 at Step 1. At Step 2, a significant conjunction × individuation interaction was found, β = .37, p = .000013, ΔR-squared = .027, for women but again not men, β = -.18, p = .291. Independent simple regressions for congruent and incongruent conjunctions were used to unpack the interactive effect for women: No effect of individuation for the congruent conjunctions was found, β = .21, p = .116. However, for incongruent conjunctions, greater individuation moderated emergent attribute application, β = -.51, p = .000017. Furthermore, the generation of constituent attributes did not result in a conjunction × individuation interactive effect for either women, β = .017, p > .05, or men β = -.108, p >.05. No other effects were obtained. Together, these results offer support for Meyers-Levy and Sternthal's (1991) notion that women process information more comprehensively and elaborate on information to a greater extent (via increased individuation in the application of more emergent attributes), when processing incongruent conjunctions. However, no evidence was found that men rely more on heuristics processing in the form of constituent attribute use. The relatively low number of men to women means these findings should be treated with some caution.

[6]To study differences and similarities across pairs of category conjunction pairs more closely we undertook further analyses. In Experiment 1, a series of one way ANOVA's were conducted to test for differences across the *four* category conjunctions. These revealed: effects for constituent attributes F (3, 78) = 3.97, p = .011, emergent attributes F (3, 78) = 4.71, p = .005, familiarity F (3, 78) = 21.83, p < .001, surprise F (3, 78) = 18.00, p <.001, and

individuation F (3, 78) = 8.14, p < .001. However, post hoc analyses showed that in terms of pairs of collapsed pairs of conjunctions (i.e. congruent-congruent and incongruent-incongruent pairs), differences were found only on the following dimensions:

1) *Familiarity*; in the incongruent pair (female bricklayer M = 1.29; SD = .56 vs. male nurse M = 2.40; SD = .94), p = .002; and in the congruent pair (female nurse M = 4.05; SD = .99 vs. male bricklayer M = 2.81; SD = 1.63), p < .001.

2) *Surprise*; incongruent (female bricklayer M = 5.05; SD = 1.40 vs. male nurse M = 3.30; SD = .1.34), p <.001.

In Experiment 2, the same one way ANOVA's as used in Experiment 1were repeated, revealing marginal effects for constituent attributes F (3, 153) = 2.43, p = .067, and emergent attributes F (3, 153) = 2.18, p = .092. While significant effects were obtained for familiarity F (3, 153) = 30.59, p < .001, surprise F (3, 153) = 32.38, p <.001, and individuation F (3, 153) = 29.31, p < .001. Post hoc analyses based on pairs of collapsed pairs of relevant conjunctions (i.e. congruent-congruent and incongruent-incongruent pairs), revealed differences on the following dimensions:

1) *Familiarity*; incongruent (female bricklayer M = 1.38; SD = .91 vs. male nurse M = 2.36; SD = 1.14, p = .002); and congruent (female nurse M = 4.25; SD = 1.55 vs. male bricklayer M = 3.13; SD = 1.63, p < .001).

2) *Surprise*; incongruent (female bricklayer M = 4.72; SD = 1.21 vs. male nurse M = 3.51; SD = 1.62), p <.001.

3) Individuation, incongruent (female bricklayer M = 2.88; SD = .91 vs. male nurse M = 3.78; SD = .85), p < .001; and congruent (female nurse M = 4.33; SD = .91 vs. male bricklayer M = 4.86; SD = 1.19, p =.017).

Analyses in Experiment 3 focused on incongruent conjunction pairs and those in the attribute generation condition only. Therefore, a series of independent samples t-tests were carried out

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to test for differences across the incongruent conjunctions. The following differences were observed:

1) *Constituent attributes;* The female bricklayer resulted in fewer constituent attributes (M = 4.90; SD = 2.21) than the male nurse (M = 6.68; SD = 2.30), t (38) = -2.50, p = .017.

2) *Emergent attributes:* More emergent attributes (M = 1.95; SD = 1.31) were generated for the female bricklayer than the male nurse (M = 1.05; SD = .96), t (38) = -2.48, p = .018.

3) *Familiarity:* Participants rated the female bricklayer (M = 1.40; SD = .53) as less familiar than the male nurse (M = 2.35; SD = 1.23), t (38) = -3.21, p = .003.

4) *Surprise:* The female bricklayer (M = 4.55; SD = 1.36) was considered more surprising than the male nurse (M = 3.15; SD = 1.46), t (38) = 3.14, p = .003.

5) *Individuation:* The female bricklayer (M = 3.06; SD = .92) was individuated to greater degree than the male nurse M = 3.99; SD = 1.15), t (38) = 3.14, p = .003.

Throughout all three experiments the patterns of data remained relatively consistent as a function of collapsed stimuli sets (pairs of category conjunctions). This was particularly so for experiments 1 and 2, where similar patterns of familiarity and surprise were found both for congruent and incongruent pairings. Experiment 3, where only incongruent conjunctions were considered, showed the same pattern as Experiments 1 and 2 for familiarity and surprise and for individuation relative to Experiment 2. In addition, differences were found for constituent and emergent attribute generation across the incongruent paring.

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Table 1.

Mean surprise and familiarity ratings, emergent and constituent attributes generated, and individuation ratings as a function of category conjunction (non-standardized data) for Experiment 1.

	Conjunction	
	Congruent	Incongruent
Surprise	2.49 (1.29)	4.20 (1.62)
Familiarity	3.42 (1.48)	1.83 (0.95)
Emergent	0.82 (0.96)	1.48 (1.23)
Constituent	8.10 (3.54)	6.16 (2.63)
Individuation	4.71 (1.81)	2.98 (1.75)

Note: Standard deviations are shown in parentheses.

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Table 2.

Mean surprise and familiarity ratings, emergent and constituent attributes generated, and individuation ratings as a function of category conjunction and cognitive load (non-standardized data) for Experiment 2.

Load		Conjunction	
		Congruent	Incongruent
High	Surprise	2.15 (2.72)	3.97 (1.77)
	Familiarity	3.93 (1.79)	1.87 (1.27)
	Emergent	0.64 (0.70)	0.53 (0.82)
	Constituent	6.06 (2.17)	5.22 (1.87)
	Individuation	4.82 (1.04)	3.48 (0.85)
Low	Surprise	2.23 (1.33)	4.25 (1.57)
	Familiarity	3.46 (1.67)	1.87 (0.99)
	Emergent	0.51 (0.65)	0.91 (1.19)
	Constituent	7.33 (2.66)	6.18 (2.22)
	Individuation	4.35 (1.09)	3.20 (1.09)

Note: Standard deviations are shown in parentheses.

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Table 3.

Mean surprise and familiarity ratings, emergent and constituent attributes generated, and individuation ratings as a function of attribute generation (non-standardized data) for Experiment 3.

	Attribute generation	
	Attribute generation	Non-attribute generation
Surprise	3.85 (1.56)	3.58 (1.74)
Familiarity	1.87 (1.04)	2.30 (1.45)
Emergent	1.50 (1.22)	-- (--)
Constituent	5.79 (2.40)	-- (--)
Individuation	3.53 (1.13)	3.28 (0.90)

Note: Standard deviations are shown in parentheses.

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Figure Caption

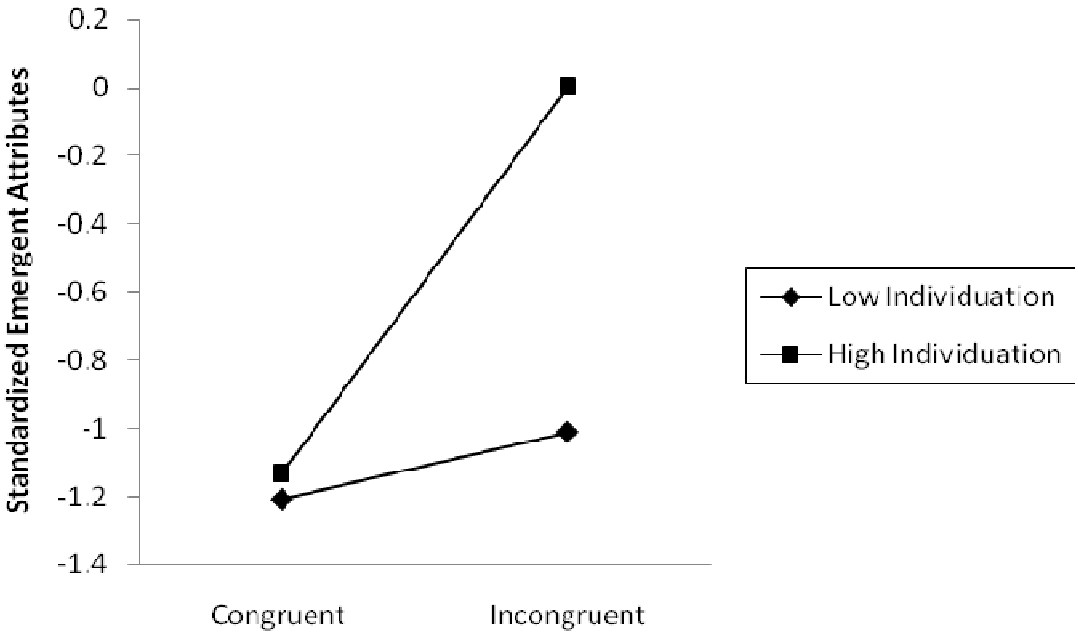

Figure 1. The effects of low versus high individuation on the application of emergent attributes across congruent and incongruent conjunctions (Experiment 1).

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Figure Caption

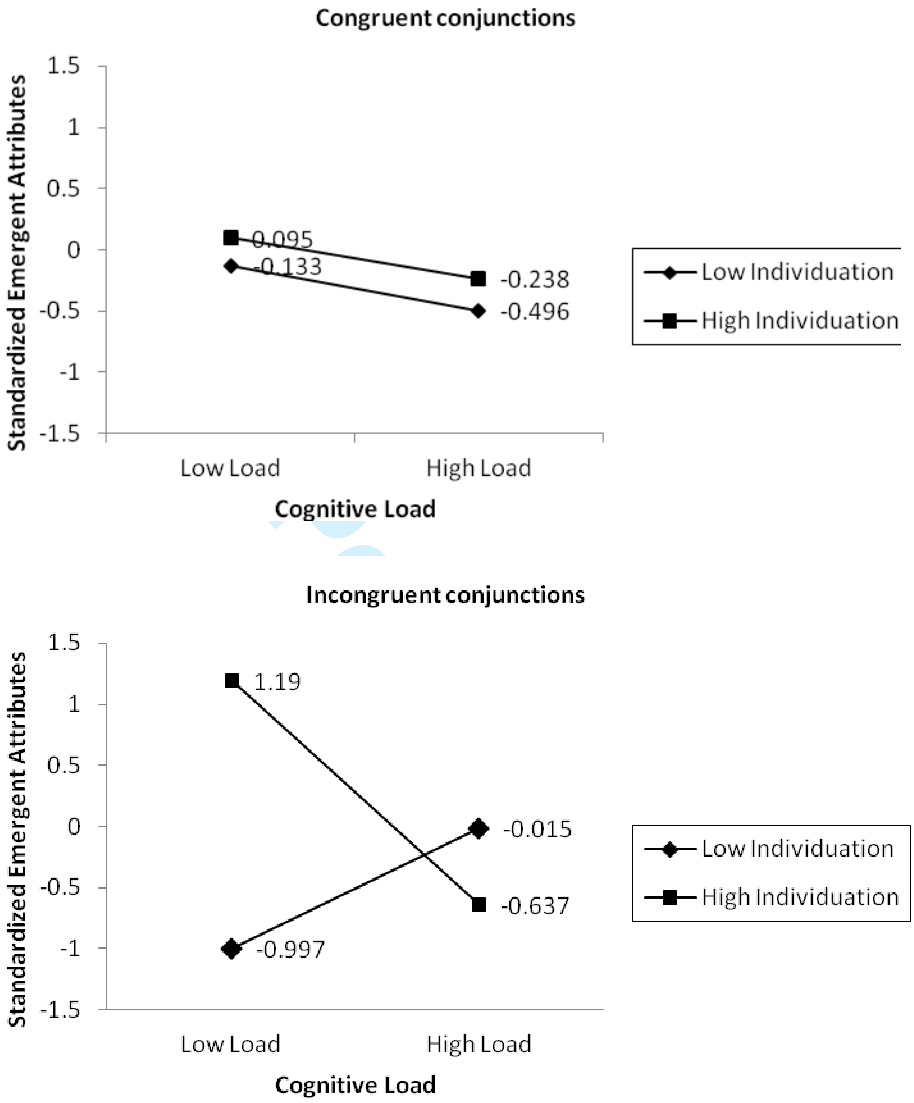

Figure 2. The effects of low versus high individuation on the application of emergent attributes for congruent and incongruent conjunctions across cognitive load (Experiment 2).

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Figure Caption

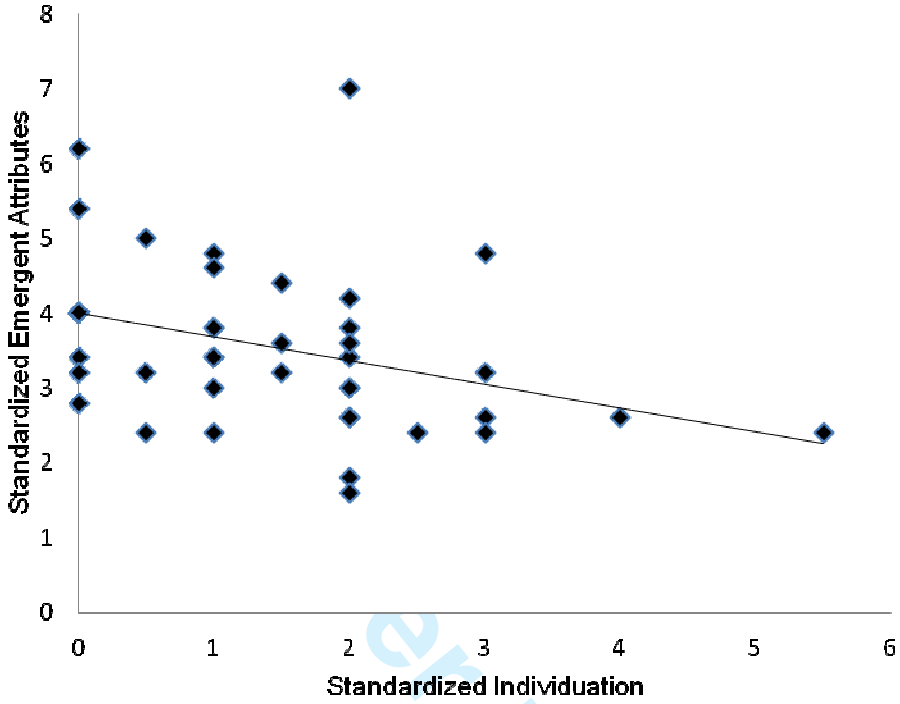

Figure 3. The relationship between Individuation and the application of emergent attributes for incongruent conjunctions (Experiment 3).

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