# The Influence of Feature Salience and Personality Traits on Implicit Stereotype Formation

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**Abstract**

The formation of stereotypes is fundamentally a cognitive process rooted in efficiency. While personality traits such as the ones in the Big Five and the Dark Tetrad are known predictors of prejudiced behavior, their influence on the initial formation of stereotypes remains unclear. This study investigated whether individual differences in personality and social attitudes influence stereotype formation during early cognitive processing. Using a modified version of the Martin et al. (2014) study, 158 participants learned to associate attributes with fictional "alien" characters across varying conditions of feature overlap (colour, shape, no overlap). It was hypothesised that traits like Openness to Experience and Agreeableness would inhibit, whereas Dark Tetrad traits would facilitate stereotype formation.

The results demonstrated a clear learning effect: participants successfully developed stereotypes, as seen by increased accuracy and reduced trait variability over time. Specifically, the strongest stereotyping occurred in the colour overlap condition. However, contrary to hypotheses, no significant correlations were found between stereotype formation and any of the personality measures (Big Five, Dark Tetrad) or social attitudes (RWA, SDO). These findings suggest that stereotype formation in this context functions as a “strong situation,” where the brain’s demand for efficiency and reliance on salient visual cues overrides individual personality differences. However, future research should use more diverse samples to determine if this cognitive dominance holds outside of homogeneous groups like the one in this sample.

# The Influence of Feature Salience and Personality Traits on Implicit Stereotype Formation

Stereotypes are often described as irrational generalizations, as they have been defined as "exaggerated beliefs associated with a social category" (Allport, 1954). An example is the widespread notion that men are assertive and ambitious, while women are caring and people-oriented (Ellemers, 2018). Stereotypical thinking has been an extensively researched topic within psychology (Augoustinos & Walker, 1998; Gilmour, 2015). However, the question regarding whether everyone is equally prone to forming stereotypes remains. Therefore, this study addresses this gap in knowledge by investigating whether individual-level differences, such as personality factors and certain social ideologies, that have proven significant within stereotypical thinking, also influence the formation of stereotypes.

Imagine walking into a busy supermarket looking for assistance: rather than evaluating the unique identity of every person in the aisle, your brain takes a cognitive shortcut based on visual cues. You immediately categorize anyone wearing a specific shirt as an employee, saving you the time of asking everyone you meet. Stereotype formation comes forth from the fact that our cognitive capacity suffers from limitations which hinder us from memorising an excess of information and stimuli (Miller, 1956; Schacter, 1999). Accordingly, during learning processes, people tend to simplify their perception by using observable characteristics to construct certain general categorisations instead of focusing on specific details (Fiske & Neuberg, 1990). On top of this, during memory recall, people prefer categorically structured memories (Bartlett, 1932; Wagoner, 2013). Consequently, individuals are inclined to retain and recall information that conforms to stereotypical schemas they have formed internally (Fyock & Stangor, 1994; Hamilton, 1979). The cognitive mechanisms of stereotype formation were clearly demonstrated by Martin et al. (2014) in a study where participants had to remember randomized personality characteristics of a large number of visually distinct "alien" characters across several "generations" of participants. In this learning design, the attributes recalled by one participant served as the learning material for the next. Over time, the attributes that participants remembered led to increasingly structured systems with higher recall accuracy and larger attribute overlap between aliens that looked alike, for example in shape or colour. Although no specific attributes where consistently linked to a specific feature, the aliens who shared certain visual features began to resemble one another in the traits that were assigned to them. This showed that stereotype-like patterns came forth from memory simplification and categorization biases, without an underlying structure. In short, stereotype formation is when

an overloaded brain succumbs to the cognitive tendency to categorise salient information and generalises this in a way that one makes inferences about an individual based on a group that individual belongs to (Marx et al., 1999).

Although stereotype formation begins as a cognitive process, the consequences of stereotypical thinking often manifest socially in how individuals perceive and treat others. When stereotypical beliefs are perceived as negative, people may internalise these ideas and express them through prejudiced behaviours toward members of certain social groups (Allport, 1954; Gilmour, 2015). Examples of this are upholding racist or homophobic rhetoric (Flynn et al., 2005; Greitemeyer, 2022; Moor et al., 2019). Interestingly, personality traits influence whether and to what extent a person adheres to stereotypical beliefs and show prejudiced behavior. (Carter et al., 2006). The composition of one's personality has mainly been studied through the lens of the Five-Factor Model by Costa and McCrae (1992), as it is one of the most influential personality frameworks. The model distinguishes five personality traits that correspond with a certain consistent pattern of thoughts and consequential actions (Costa & McCrae, 1992). Amongst these personality traits, openness and agreeableness have consistently been found to be associated with adherence to stereotypical schemas by prejudiced behaviours (Butrus & Witenberg, 2013; Chen & Palmer, 2017; Sibley & Duckitt, 2008).

Openness to experience (openness) is the trait defined as being intellectual and cognitively explorative, as opposed to being conservative and preferring routine (Costa & McCrae, 1992). Low openness is consistently related to increased prejudiced behaviours, due to people low in openness preferring to stick to their strong conventional worldviews (Chen & Palmer, 2017; Flynn, 2005). In contrast to those high in this trait, it is hypothesised that those low in openness do not use cognitive flexibility to challenge conventional wisdom or become receptive to new ideas, and therefore engage in prejudice based on stereotypical schemas. However, the dual-process motivational approach to prejudice by Sibley & Duckitt (2008) suggests that the relationship between low openness and prejudiced behaviour is not straightforward, but instead is mediated by a certain ideological attitude called Right-Wing Authoritarianism (RWA). This attitude represents strong adherence and conformity to traditional and conventional values which leads to obedience to existing hierarchical authority (Butler, 2000; Cramer et al., 2013). High scores on Right-Wing Authoritarianism are also strongly associated with increased prejudiced behaviour (Sibley & Duckitt, 2008). This is in line with the finding that authoritarians are more prone to use heuristic processing (Kemmelmeier, 2010). Relying on such cognitive shortcuts is well-documented to facilitate

stereotype formation and maintenance (Macrae & Bodenhausen, 2000; Fiske & Neuberg, 1990). On top of this, the need for cognitive closure, which is the non-receptiveness to alternative views, is at the core of both low openness and high scores on Right-Wing Authoritarianism (Onraet et al., 2011). This explains how those who score high on Right-Wing Authoritarianism are mostly fairly extreme in their ideologies and stereotypical beliefs as well (Kemmelmeier, 2010).

Agreeableness is a trait characterised by altruism, empathy, tender-mindedness and compliance (Costa & McCrae, 1992). Similarly, low agreeableness is associated with increased prejudiced behaviours (Butrus & Witenberg, 2013). Pro-sociality, which is at the core of agreeableness, has been proposed as a protective factor against prejudiced behaviour as it makes one less likely to reduce others to stereotypical schemas alone. This is consistent with the finding that within the relationship between low agreeableness and increased prejudiced behaviour, low empathy levels play a mediating role (Bergh & Akrami, 2016; Butrus & Witenberg, 2013). As with low openness, the dual-process motivational approach to prejudice also found that controlling for a certain ideological attitude significantly reduced the association between low agreeableness and prejudiced behaviour (Sibley & Duckitt, 2008). In this case, this was the attitude of the Social Dominance Orientation (SDO) which focuses on group-based hierarchies and endorses social inequality by the belief that certain societal groups should be above others in status (Moor et al., 2019; Sibley & Duckitt, 2008). Those high in this trait tend to engage in prejudiced behaviours towards members of outgroups (Duckitt, 2006). Interestingly, this relationship between SDO and stereotyping is contingent on one's level of empathy as well (Sidanius et al., 2013). SDO is related to decreased empathy in general, especially towards out-group individuals (Hudson et al., 2019). In fact, towards out-group members, it has even been found that those scoring high in SDO might experience counter-empathy which is the feeling of pleasure at the misfortune of others. Therefore, this ideological attitude was proposed as a mediator between low agreeableness and prejudiced behaviour (Sibley & Duckitt, 2008). This mediating effect is suggested to be through the trait of tough-mindedness, which relates to a lack of empathy (Crawford & Brandt, 2019; Hodson et al., 2009).

In addition to the Five-Factor personality traits, the traits in the Dark Tetrad posited by Paulhus (2014) have also been proven to play a role in prejudiced behaviour based on stereotypical schemas. Interestingly, the Dark Tetrad includes four personality traits which are all negatively associated with empathy and pro-social behaviour as well (Bonfá-Araujo et al.,

2023; Palmer & Tackett, 2018). Firstly, Machiavellianism is a trait which leads one to be manipulative and use strategic flattery and deception to get their way (Paulhus & Williams, 2002; Paulhus, 2014). Subclinical narcissism is a trait characterised by grandiosity, entitlement and a superiority complex. Subclinical psychopathy is related to anti-social behaviours, impulsivity and thrill-seeking. Lastly, sadism describes those who enjoy causing verbal or physical distress or hurt to others for their enjoyment. Just as these traits encompass low empathy, they are all associated with low agreeableness (Book et al., 2016; Gómez-Leal et al., 2024; Paulhus & Williams, 2002). Predictably, the traits in the Dark Tetrad have been found to explain some variance in prejudiced behaviour based on stereotyped schemas as well (Greitemeyer, 2022; Moor et al., 2019). The ideological variables in the dual-process motivational approach to prejudice have proven to have more predictive utility for prejudiced behaviour than just the Dark Tetrad traits, but when they are considered together, the effects of low agreeableness alone are redundant (Hodson et al., 2009). Bergh and Akrami (2016) even posit that considering agreeableness as a general personality trait is unnecessary for researching prejudiced attitudes, as controlling for specific traits such as dark traits and empathic concern renders agreeableness unrelated to prejudiced behaviour.

Although previous research has provided useful information about individual-level personality and attitude factors in eventual adherence to stereotypical schemas by prejudiced behaviour, a lot is still unknown about the effect of these factors in the primary process of stereotype formation. For example, Butrus & Witenberg (2013) found that although empathy was a protective factor from externalising prejudiced behaviour, it could not be confirmed that empathy truly protected someone from internalising stereotypical beliefs. Thus, the objective of this paper is to address this knowledge gap. This is done by expanding on the results of the study of Martin et al. (2014), by conducting a similar experiment. Their research has made a significant contribution to research on stereotype formation by using made-up characters defined by basic shapes, colours and movements. Therefore, these characters and attributes could not subconsciously be associated with individuals from particular social groups or ethnic backgrounds and stereotype formation could be researched on a cognitive level, supposedly free from the influence of pre-existing ideologies. To address this gap in knowledge, this paper builds further on the study by Martin et al. (2014), but with changes that allow for the research of individual differences. Instead of using a design in which the information is passed from one participant to the next between subjects, all participants in this study are exposed to the full set of alien characters in a within-subject design. On top of this, the number of alien figures

has been reduced to make the task more manageable. These changes make it possible to examine whether individual personality traits and ideological beliefs influence stereotype formation at the cognitive level, or whether such factors really only play a role in the later expression of stereotypes. More specifically, this paper is framed by the main research question: *How do individual-level factors, particularly the personality traits within the Five-Factor Model and the Dark Tetrad, influence the formation and perpetuation of stereotypes during the initial phases of cognitive processing?* The study includes the following individual-level variables: the Five-Factor Model personality traits (specifically openness and agreeableness), the Dark Tetrad traits, RWA, SDO, and empathy. Direct, as well as indirect relationships between these traits and the extent of stereotype formation will be examined. Specifically, it will be tested whether ideological attitudes such as RWA and SDO mediate the relationship between personality traits and stereotype formation by reinforcing negative social perceptions. Also, the hypothesised mediating role of a lack of empathy in the relationship between SDO, low agreeableness, dark traits, and stereotype formation is examined.

Based on existing research on the endorsement of stereotypes through prejudiced behaviour, the general hypothesis is that similar patterns will be replicated during the cognitive stages of stereotype formation. Specifically, it is hypothesised that participants will demonstrate a learning curve characterized by increased accuracy and decreased trait variability across blocks. Furthermore, this stereotype formation is expected to be stronger for categories with feature overlap (e.g., colour) compared to no overlap. It is expected that higher levels of openness to experience and agreeableness will be associated with decreased adherence to stereotypes during initial cognitive processing, while higher scores on the Dark Tetrad traits will positively correlate with increased stereotype formation. As for the hypothesised mediators, RWA and SDO are expected to mediate the influence of low Openness to Experience, and low Agreeableness on stereotype formation. Additionally, reduced empathy is expected to further explain the impact of the Dark Tetrad traits and low Agreeableness as well.

## Method

For this study, the aim was to include a sufficient number of participants to detect significant relationships between personality traits and stereotype formation. A power analysis was conducted using G*Power (Faul et al., 2009) based on Pearson's correlation tests. Previous meta-analytic research shows that personality traits such as Openness to Experience are reliably associated with prejudice, with effect sizes typically around $r = .30$ (Sibley & Duckitt, 2008). To detect an effect with a statistical power of .95 and an alpha error probability of .05 (one-tailed), a minimum sample of 111 participants is required.

The final sample consisted of 158 participants which indicates that the study has sufficient statistical power to detect the expected effects. Within the sample, 137 participants were female and 21 participants were male. The ages of the participants ranged between 17 and 30 years old ($M = 20.27$). The recruitment strategy mainly involved selecting participants from the psychology student population at Erasmus University Rotterdam, offering course credits as incentives ($N = 149$). The remaining participants ($N = 9$) were recruited outside of this population and participated on a voluntary basis. The study was approved by the Ethics Committee of the Department of Psychology, Education and Child Studies (DPECS) at Erasmus University Rotterdam.

### Questionnaires

The Big Five Inventory (BFI) was used to assess participants' personality traits according to the Five-Factor Model (John et al., 1991). The questionnaire measures each trait in the model and consists of 44 items which participants each score on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The BFI has demonstrated high reliability across various populations, with Cronbach's alpha typically being about 0.80 for every dimension measured (Hongyan et al., 2015).

As for assessing the participants' dark personality traits, The Short Dark Tetrad (SD4) questionnaire was used (Paulhus et al., 2021). It consists of 28 items rated on a 5-point Likert scale similar to the BFI. In this questionnaire, each trait in the Dark Tetrad is represented by seven items. The SD4 questionnaire also demonstrated good reliability, ranging between a Cronbach's alpha of .78 and .83 for the four traits.

The Interpersonal Reactivity Index (IRI) assessed participants' empathic tendencies regarding perspective-taking and empathic concern (Davis, 1980; De Corte et al., 2007). The questionnaire has 28 items measured based on a 5-point Likert scale ranging from 1 (item does

not describe me well) to 5 (item describes me very well). The higher the scores, the greater the levels of empathy. Cronbach's alpha coefficients range from .70 to .78.

Social Dominance Orientation was assessed by the SDO scale consisting of 16 items which are each statements that participants had to label their feelings towards on a 7-point Likert scale ranging from 1 (very negative) to 7 (very positive) (Pratto et al., 1994). The higher the scores, the stronger the endorsement of social dominance in the participant. The questionnaire has a reliability coefficient of 0.90.

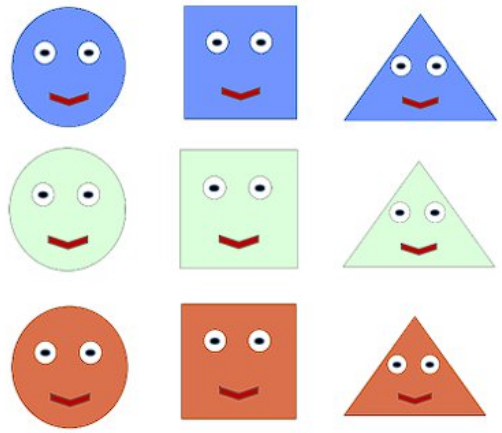
Lastly, Right-Wing Authoritarianism was assessed by the RWA scale (Altemeyer, 1998). This measured participants' authoritarian attitudes and adherence to traditional values. Participants rated their agreement with statements indicative of authoritarian attitudes using a Likert scale ranging from -4 (strongly disagree) to +4 (strongly agree). The scale has a reliability coefficient of about 0.92.

**Stimulus Materials and Equipment**

The experiment was administered through the *E-Prime* software. The stimulus materials consisted of nine unique characters, also called "alien images" in the study by Martin et al. (2014). These were formed by combining a shape (square, triangle or circle) with a colour (green, blue or red). Every unique alien image was randomly assigned six attributes that could be used to describe a person, such as tidy or arrogant. There were a total of 48 possible attributes. For clarification, Figure 1 displays an overview of the nine alien images and their rudimentary shapes and colour combinations.

**Figure 1**

*Overview of the Alien Images*



**Procedure**

Firstly, the aforementioned personality, empathy and social attitudes questionnaires were administered to all participants. This was done through the online survey platform *Qualtrics* and could be completed anywhere the participant chose. The participants were then individually invited to the Erasmus Behavioural Lab at Erasmus University Rotterdam to participate in the experiment which largely followed the same principles and phases as in the study by Martin et al. (2014). Throughout the experiment, participants followed the instructions provided to them on the computer screen.

The participant was tasked with memorising all nine alien images along with the six random attributes associated with them. In this initial training phase, they were exposed to a fixation cross for 500 milliseconds on a computer screen before they were shown the 240 x 120-pixel alien images and their attributes for 15 seconds. Then there was a 20-second break, followed by the nine alien images being shown once more in a randomised order. After another 20-second break, the nine alien images were shown one last time in another randomised order. Subsequently, the participants underwent a test phase in which they were presented with all nine aliens one by one, and were tasked with choosing six attributes from the list of 48 possible attributes that they recalled being associated with each specific alien.

After the initial training and test phase, the second training phase followed. In this phase, the participant was again presented with all nine alien images. However, unlike during the initial training phase, these images were not accompanied by the initial randomly chosen attributes. Instead, these images were accompanied by the attributes the participants chose as best fitting for that specific alien image during their previous test phase. Furthermore, unlike during the initial training phase, instead of being shown the images three times in total, the participant only got to see and memorise the images once during other training phases.

After the second training phase, the second test phase took place in which the participant was once again tasked with choosing the six attributes they recalled for each alien. This cycle of training and testing, where the participant's recalled attributes from the previous test phase served as the learning material for the subsequent training phase, was repeated three more times, resulting in a total of five blocks.

**Data processing and statistical analyses**

In this study, the independent measures are the personality traits in the Five-Factor Model and the Dark Tetrad, the participant’s level of empathy, Right-Wing Authoritarianism

and Social Dominance Orientation. As for the dependent measures, this research largely followed those detailed in the study by Martin et al. (2014). The dependent measure accuracy consisted of the percentage of correctly remembered attribute-alien associations made by the participants after each block, which is a round of a learning phase and a subsequent test phase. Trait variability was a dependent variable measured by how many unique attributes out of the 48 possible options the participants chose to describe the alien figures per block. Therefore, this number could range from six to 48. The dependent measure of structure was expressed by overlap scores. These were assessed per block by determining the mean overlap between the attributes used to describe an alien image, and those used for other similar aliens. The similarity between aliens was determined by a particular feature that they had in common. There could either be a similarity in colour, in shape, or no similarity at all. The overlap scores ranged from zero to six attributes for each of the 36 pair-wise comparisons made. Lastly, the dependent measure of stereotyping was measured by the average of the colour and shape overlap by the block 5, the last block. To account for the random overlap that would be found even when there were no similarities, this stereotyping score was calculated as the difference between that average and the no-similarity overlap. Stereotyping showed how susceptible a participant was to using the same attributes for similar looking alien images.

The statistical analyses in this study were conducted using *SPSS* software. To evaluate the hypotheses regarding the impact of personality traits on stereotype formation, Pearson correlation coefficients were computed to examine whether the level of openness to experience, agreeableness, or dark traits significantly influenced the amount of attribute overlap regarding alien images that shared certain category dimensions.

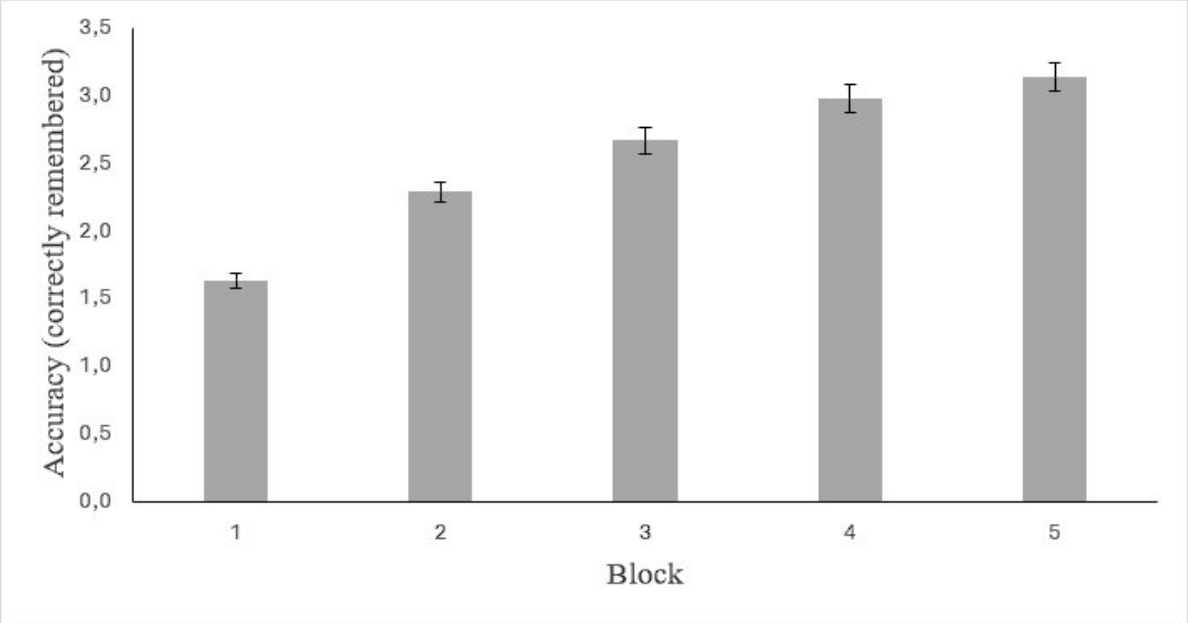
## Results

### Development of Stereotypes Across Blocks

The mean accuracy increased per block. These means are portrayed in Figure 2. Therefore, a Repeated Measures ANOVA was conducted on the accuracy scores. Firstly, a Mauchly's test of sphericity was done which came out significant, meaning that the assumption of sphericity was violated, $\chi^2(9) = 261.77$, $p < .001$. Therefore, the Greenhouse-Geisser correction ($\varepsilon = 0.511$) was applied. The results showed the accuracy of the participants significantly improved across the blocks, $F(2.043, 320.774) = 144.63$, $p < .001$, $\eta_p^2 = .48$. Through a within-subject contrast analysis, it was revealed that this increase in accuracy followed a significant linear trend, $F(1, 157) = 214.87$, $p < .001$, $\eta_p^2 = .58$, which means there is a steady improvement in performance per block. However, since there was also a significant quadratic trend $F(1, 157) = 40.19$, $p < .001$, $\eta_p^2 = .20$, this suggests there would be a possible

**Figure 2**

*Mean Accuracy Scores Per Block*



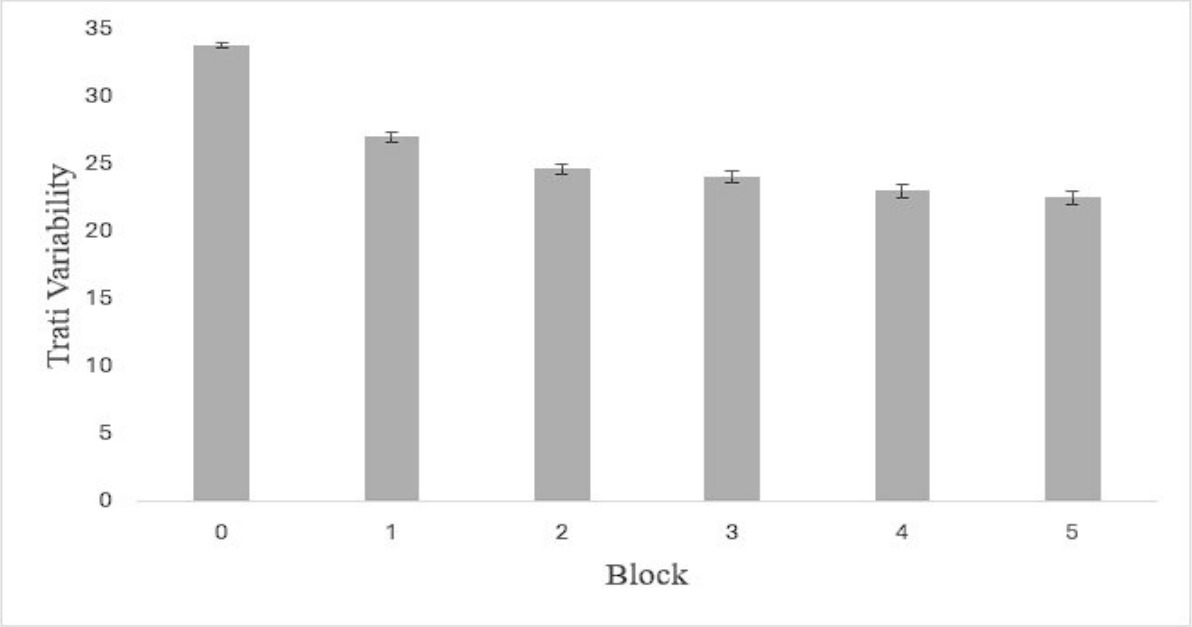

leveling-off of the significant linear effect in later blocks.

The mean number of unique traits (trait variability) per block are portrayed in Figure 3. The means show a decrease in trait variability per block and the significance of this decrease was analysed with a Repeated Measures ANOVA as well. Firstly, the Mauchly's test indicated

a violation of sphericity, $\chi^2(14) = 254.96$, $p < .001$. Thus, a Greenhouse-Geisser correction was applied ($\varepsilon = 0.541$). The Repeated Measures ANOVA showed that the main effect of block was significant, $F(2.705, 424.623) = 265.10$, $p < .001$, $\eta_p^2 = .63$, meaning a significant decrease in trait variability. This decrease also showed a significant linear trend, $F(1, 157) = 379.08$, $p < .001$, $\eta_p^2 = .71$. Since there was also a quadratic trend found, $F(1, 157) = 242.27$, $p < .001$, $\eta_p^2 = .61$, this suggested a leveling-off in this linear decrease of trait variability over time.

**Figure 3**

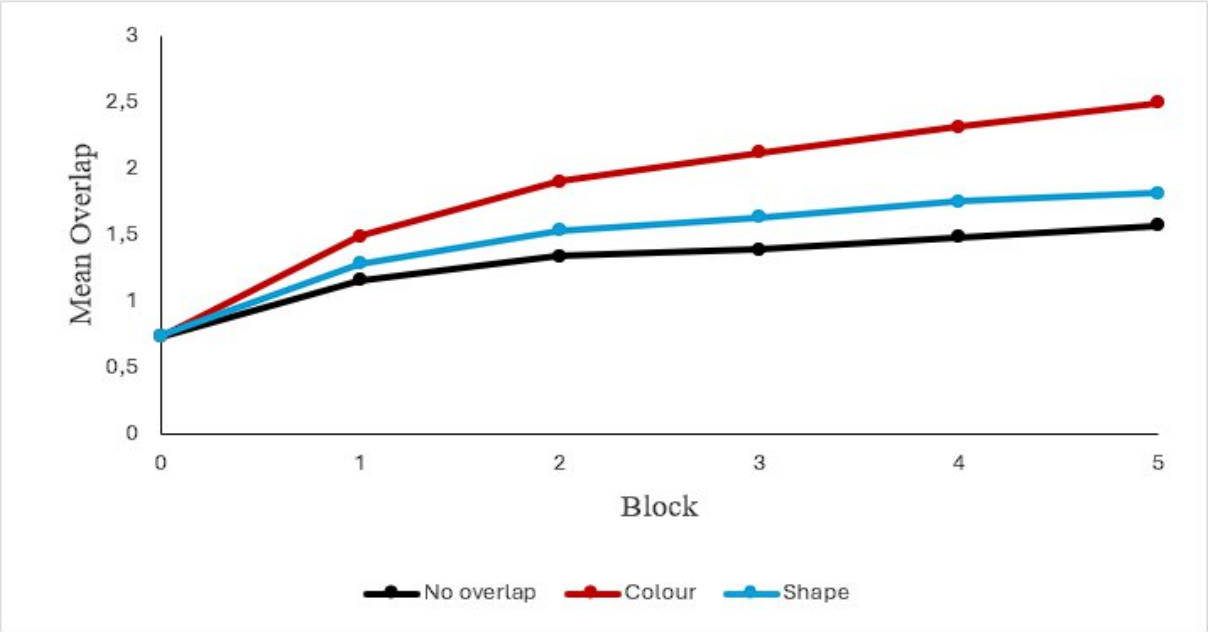
*Mean Trait Variability Per Block*




To investigate whether the increase in overlap differed between the conditions, a 3 (Overlap: Colour, Shape, No Overlap) × 6 (Block: 0–5) repeated measures ANOVA was conducted. Mauchly's test indicated that the assumption of sphericity was violated, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates. The results showed a significant main effect of Block, $F(2.38, 373.00) = 184.27$, $p < .001$, $\eta_p^2 = .54$, indicating that the mean overlap scores increased across the blocks. More importantly, the interaction effect between Overlap and Block was significant, $F(4.28, 672.00) = 31.11$, $p < .001$, $\eta_p^2 = .17$. This indicates that the increase in overlap differed significantly between the conditions. As shown in Figure 4, the increase in similarity was significantly stronger for the Colour condition compared to the Shape and No-Overlap conditions.

**Figure 4**

*Mean Color/and Shape Overlap Per Block*




Taken together, the data provide support for the formulated hypotheses. First, the increase in accuracy combined with the decrease in trait variability confirms that participants learned the task and simplified their descriptions over time, which is indicative of a stereotype formation process. Most importantly, the analyses revealed that this process was influenced by the type of overlap. The increase in similarity was significantly stronger for the Colour condition compared to the Shape and No-Overlap conditions. This supports the specific hypothesis that stereotype formation is stronger for categories defined by feature overlap (e.g., colour) compared to categories with no overlap.

**Individual Differences in Stereotyping**

Table 1 presents the descriptive statistics for all the personality and ideology measures considered in the study. To examine the relationship between these personality traits and their relationship to stereotype formation, one-tailed Pearson correlations were computed. As previously described, the dependent measure of stereotyping reflects how susceptible a participant was to assigning the same attributes to similar-looking aliens, calculated by taking the attribute overlap in the final block and subtracting the overlap found in the no-similarity condition. Contrary to the hypotheses, no significant correlations were found between Stereotyping and Openness to Experience, $r(156) = -.02$, $p = .39$, or Agreeableness, $r(156) = .07$, $p = .21$. Similarly the composite Dark Tetrad score did not correlate significantly with

Stereotyping, $r(156) = .02$, $p = .42$, nor did any of the four Dark Tetrad traits. Finally, no significant correlations were observed between Stereotyping and the remaining measures: Emotional Concern, $r(156) = .02$, $p = .41$, Perspective Taking, $r(156) = -.07$, $p = .18$, RWA, $r(156) = .07$, $p = .19$, and SDO, $r(156) = .03$, $p = .37$.

Further analyses were conducted to explore the relationship between the personality measures. Due to the exploratory nature of these analyses, the alpha level was maintained at $\alpha = .05$ without correction for multiple comparisons. Results showed a negative correlation between Openness to Experience and RWA, $r(156) = -.21$, $p = .005$, and between Agreeableness and SDO, $r(156) = .31$, $p < .001$. As expected, Agreeableness had a moderately strong positive correlation with the empathy subscales Emotional Concern, $r(156) = .41$, $p < .001$, and Perspective Taking, $r(156) = .43$, $p < .001$. Finally, regarding the Dark Tetrad traits, Emotional Concern correlated negatively with Psychopathy, $r(156) = -.14$, $p = .04$, and Sadism, $r(156) = -.37$, $p < .001$. Perspective Taking correlated negatively with Machiavellianism, $r(156) = -.14$, $p = .04$, Psychopathy, $r(156) = -.26$, $p < .001$, and Sadism, $r(156) = -.21$, $p = .005$. A complete overview of all correlations between the study variables is presented in Table 2.

**Table 1**

*Descriptive Statistics for Personality Measures*

| | Range | Minimum | Maximum | *M* | *SD* |
|---|---|---|---|---|---|
| Big Five Inventory | | | | | |
| Openness to Experience | 1 - 5 | 2.20 | 5.00 | 3.71 | 0.56 |
| Agreeableness | 1 - 5 | 2.33 | 5.00 | 3.76 | 0.50 |
| Dark Tetrad | | | | | |
| Narcissism | 1 - 5 | 1.14 | 4.57 | 2.72 | 0.61 |
| Psychopathy | 1 - 5 | 1.00 | 3.57 | 1.94 | 0.56 |
| Machiavellianism | 1 - 5 | 1.57 | 4.71 | 3.27 | 0.56 |
| Sadism | 1 - 5 | 1.00 | 4.14 | 2.26 | 0.67 |
| Empathy | | | | | |
| Emotional Concern | 1 - 5 | 0.86 | 4.00 | 3.08 | 0.61 |
| Perspective Taking | 1 - 5 | 1.43 | 4.00 | 2.95 | 0.59 |
| Social Attitudes | | | | | |
| RWA | -4 - 4 | -4.00 | 0.84 | -2.20 | 1.10 |
| SDO | 1 - 7 | 1.00 | 5.81 | 2.10 | 0.91 |

*Note.* $N = 158$. Range represents the potential range of scores in the questionnaire

**Table 2**

*Personality Measures Correlation Table*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Stereotyping | - | | | | | | | | | | | |
| 2. Openness to Experience | -.02 | - | | | | | | | | | | |
| 3. Agreeableness | .07 | .08 | - | | | | | | | | | |
| 4. Narcissism | .04 | .29** | -.17* | - | | | | | | | | |
| 5. Psychopathy | -.01 | .18* | -.31** | .30** | - | | | | | | | |
| 6. Machiavellianism | .09 | -.06 | -.16* | .26** | -.05 | - | | | | | | |
| 7. Sadism | -.07 | -.12 | -.35** | .23** | .28** | .34** | - | | | | | |
| 8. Dark Tetrad Score | .02 | .10 | -.38** | .69** | .58** | .58** | .74** | - | | | | |
| 9. Emotional Concern | .02 | .32** | .41** | -.13 | -.14* | -.07 | -.37** | -.29** | - | | | |
| 10. Perspective Taking | -.07 | .21** | .43** | -.09 | -.26** | -.14* | -.21 | -.27** | .48** | - | | |
| 11. RWA | .07 | -.21** | -.06 | .13 | .05 | .08 | .14* | .16* | -.18* | -.22** | - | |
| 12. SDO | .03 | -.06 | -.31** | .19 | .19** | .06 | .26** | .28** | -.39** | -.39** | .56** | - |

*Note. N = 158.* Values represent Pearson correlation (one-tailed). * indicates $p < .05$. ** indicates $p < .01$.

# Discussion

## Summary of the Findings

The aim of the study was to investigate the influence of individual-level factors, specifically the Five-Factor Model and Dark Tetrad traits, on the formation of stereotypes during early cognitive processing. The results show that the task itself was effective in measuring stereotype formation. Participants showed a clear learning curve with increased accuracy and decreased trait variability over time, which suggests a general simplification and stereotyping of the aliens as a whole group. More importantly, a more distinct form of sub-group stereotyping emerged regarding specific visual features. This specific process of stereotype formation was found to be significantly facilitated by feature overlap, especially when the aliens were defined by the same colour. Contrary to the hypotheses, however, no significant relationships were found between personality traits and the degree of stereotyping. Neither the 'bright' traits (such as Openness to Experience and Agreeableness) nor the 'dark' traits (Dark Tetrad) predicted the formation of stereotypes in this task. In short, the results suggest that stereotype formation is a strong process driven by obvious visual features, but it does not seem to be influenced by personality traits in this specific task.

## Cognitive Mechanisms: The Role of Salience

The finding that feature overlap significantly facilitated stereotype formation aligns with cognitive theories about feature salience and categorization (Macrae & Bodenhausen, 2000), especially since the strongest effect was observed in the condition in which the aliens overlapped in colour. From a cognitive perspective, human memory is limited and reconstructive. To manage this limited capacity, people often forget specific details and instead group stimuli based on their most immediately observable characteristics, leading them to confuse items that look alike (Miller, 1956; Schacter, 1999). It is plausible that in this experiment, colour acted as a highly salient visual cue that required less cognitive effort to process compared to shape. Therefore, when participants see an alien, its distinct colour acts as a strong retrieval cue. As a result, attributes associated with other aliens of the same colour are also retrieved from memory and mistakenly assigned to it.

This result has important implications for understanding real-world stereotypes. It suggests that the cognitive mechanism underlying stereotype formation is biased towards highly visible, surface-level characteristics. Just as participants in this study relied on the salient cue of colour to generalize traits across the alien stimuli, individuals in social contexts frequently use immediately observable phenotypes like skin tone or gender as initial cues for

categorization (Allport, 1954; Bigler & Liben, 2006). While non-visual characteristics, such as a person's profession or political affiliation, can also strongly trigger stereotypes once they become known, visually salient features often serve as the most immediate heuristic. This supports the idea that stereotyping is, at its core, a byproduct of the cognitive system's reliance on salient cues to manage information overload.

**Explaining the Null Results: Situation and Sample**

While the cognitive mechanisms of stereotype formation were demonstrated, the expected influence of personality traits was not observed. Three primary factors likely account for this absence of significant correlations.

First, the task may have functioned as a "strong situation" (Cooper & Whitney, 2009). In these situations, external cues are so powerful that they overshadow individual personality differences. Specifically, the feature overlap, especially colour, was such a clear guide that many participants inherently relied on it. Personality tends to play a role in unclear situations, not in structured tasks where the goal is obvious.

Second, there is a fundamental difference in how the outcome variable (stereotyping) was measured compared to previous literature. While both the current study and previous research (e.g., Sibley & Duckitt, 2008) used explicit self-report questionnaires to assess personality traits, previous studies typically also relied on explicit self-report measures to assess prejudiced behaviour itself. In contrast, the current study measured stereotype formation *implicitly* as an automatic cognitive process. Participants completed what appeared to be a neutral memory task about alien characters, without being aware that their subconscious tendency to group stimuli by visual features was being assessed. These results suggest that while personality traits heavily influence whether someone consciously (explicitly) endorses prejudiced views, the initial, automatic (implicit) mechanism of categorising information is a universal brain function that occurs independently of one's personality.

Third, the characteristics of the sample have to be considered. The sample was relatively homogenous, non-authoritarian sample with participants scoring high on socially desirable traits like Agreeableness ($M = 3.76$) and Openness ($M = 3.71$), but low on the "dark" traits like Psychopathy ($M = 1.94$) and Sadism ($M = 2.26$). The sample simply did not contain enough individuals with high levels of antagonistic or authoritarian traits to statistically detect a relationship with stereotyping similar to the one found in prejudiced behaviour (Paulhus & Williams, 2002; Sibley & Duckitt, 2008). However, the homogeneity of the sample did not

restrict the variance enough to prevent detecting any significant effects. The significant correlations found in the literature between the personality traits themselves (such as between Agreeableness and Empathy) confirm that there was sufficient statistical variance within the data to detect theoretically consistent effects (Sibley & Duckitt, 2008). Therefore, the absence of a relationship between personality and stereotyping is not simply due to a lack of variation in the participants' scores. Rather, it is a meaningful null result, reinforcing the conclusion that early cognitive categorization is driven by visual salience rather than individual personality differences.

**Limitations and Future Research**

These findings regarding the sample and the specific nature of the null results point towards several limitations. First, the homogeneity of the sample is problematic for the external validity of the study. The participants were mainly university students, a population often characterized as WEIRD (Western, Educated, Industrialized, Rich, and Democratic) (Henrich et al., 2010). Because this group is generally young, liberal, and highly educated, they show less variation in personality traits than the general population. It remains plausible that traits like RWA or the Dark Tetrad *do* influence stereotyping, but only in diverse populations with wider ranges of political and social attitudes. Future research should therefore attempt to replicate this study with a more diverse sample to determine if personality plays a larger role when the range of traits is not artificially compressed.

A second limitation concerns the ecological validity of the task. Using fictional aliens was useful for creating a controlled experiment, but it created an abstract, neutral environment that differs from real life. Real-world stereotypes are rarely neutral; they are deeply connected to emotions (Smith, 1993). Because this task stripped away those emotional complexities, it may have functioned more like a pattern-recognition puzzle than a social simulation. Consequently, personality traits that normally influence social behaviour through emotion (like Empathy) or threat (like RWA) may simply not have been triggered in this context. Empathy is inherently relational and is typically triggered by perceiving the emotional cues or suffering of a target (Decety & Jackson, 2004). Because the alien characters were entirely abstract and emotionally neutral, this necessary trigger was missing. Similarly, Right-Wing Authoritarianism is driven by a perceived threat to societal norms or out-group competition (Sibley & Duckitt, 2008). The aliens with different colours or shapes carry no social weight, hierarchical threat, or real-world consequence. Thus, while the task successfully measured basic cognitive categorization, it bypassed the motivational and emotional triggers that usually

activate these specific personality traits or ideologies. Future research could address this by incorporating socially meaningful contexts into the learning paradigm, for example using human-like aliens with realistic societal roles.

Third, although necessary, the reliance on self-report measures is a methodological limitation. Assessing traits like Psychopathy, Sadism and other personality measures via questionnaires is susceptible to social desirability bias (Costa & McCrae, 1992). Participants may have underreported socially aversive traits to maintain a positive self-image, which likely contributed to the lack of variance in the dark traits discussed earlier.

Finally, the length of the task may have introduced fatigue effects (Boksem et al., 2005). The experiment required sustained attention across six blocks, which is quite demanding. Although the learning curve indicated continued engagement, feedback from participants suggested that the repetitive nature of the task became monotonous, and boring in later blocks. This potential boredom could have led to 'mechanical responding,' where participants clicked without actively thinking (Meade & Craig, 2012). Future studies could use fewer blocks or add elements to keep participants interested, without affecting the quality of the data.

**Conclusion**

In conclusion, this study demonstrated the actual process of stereotype formation, showing that individuals categorize stimuli based on salient visual features like colour. Rather than suggesting that these cognitive mechanisms override individual personality traits, the findings indicate that cognition and personality likely regard different aspects of stereotyping. While early cognitive categorization is driven by the brain's universal demand for efficiency and visual salience, personality traits are likely more related to the emotional and explicit components of prejudice.

However, given the homogeneity of the current sample, it remains possible that the lack of personality effects in this specific task was also influenced by limited variation in traits like RWA or the Dark Tetrad. Future research should replicate this design in a more diverse sample and add emotionally engaging contexts to truly test the interaction between personality and cognition. Ultimately, a complete understanding of stereotyping requires acknowledging both the automatic cognitive shortcuts that form categories, and the individual differences that decide how those categories are treated in the real world.

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