On personality and piloerection: Individual differences in aesthetic chills and other unusual aesthetic experiences.

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Abstract:

Relatively little is known about aesthetic chills, the experience of goose bumps and shivers in response to the arts. The present study explored how often people report such experiences and what people who often experience them are like. After noting which domain of the arts they encountered most often in daily life, young adults (n = 188) rated how often they experienced aesthetic chills and related states. Latent variable models suggested three latent factors—aesthetic chills, feeling touched, and absorption—that shared a higher-order factor. As expected, people high in openness to experience and expertise in the arts consistently reported experiencing aesthetic chills more often. The Big Five personality factors accounted for about half of the variance, whereas cognitive and demographic variables were relatively unimportant. The individual-differences approach thus seems like a promising complement to experimental work on aesthetic chills.

Keywords: aesthetic chills | aesthetics | emotion | openness to experience | art | psychology

Article:

If empirical research is to be trusted, you almost certainly have listened to music today and are probably listening to music right now (Juslin, Liljeström, Västfjäll, Barradas, & Silva, 2008). Did you get goose bumps while listening to it? A small body of work shows that people often experience aesthetic chills—a feeling of goose bumps and shivers down the spine (Goldstein, 1980)—while listening to music, viewing art and designed objects, and engaging with narratives, but the study of unusual aesthetic states—particularly piloerection—has a hairy past. Using an individual differences approach, the present work combs through the tangles of two aspects of aesthetic chills: how they relate to other unusual aesthetic states and what people who experience chills often are like.

The Three Strands of Aesthetics Research

Research on aesthetic experience splits into three strands. The first strand, based in the Berlyne (1971) tradition of experimental aesthetics, studies feelings of liking, preference, pleasure, and beauty (Armstrong & Detweiler-Bedell, 2008; Leder, Belke, Oeberst, & Augustin, 2004). The second strand, based in emotion psychology, studies discrete emotional states, such as enjoyment, interest, anger, and disgust (Silvia, 2005, Silvia, 2009). The third strand, and the one most relevant to the present research, studies a family of unusual states that includes aesthetic chills, feeling touched and moved, losing track of time, feeling like crying, and an experience of awe, absorption, and detachment from one's surroundings. Of these, aesthetic chills have been the most widely studied. It's hard to find a label for such a motley band of experiences: they don't have much in common except that they aren't simple preferences or discrete emotions (Konečni, 2005, Konečni, 2008), they seem to be common responses to music (Grewe, Kopiez, & Altenmüller, 2009), and they are often part of powerful aesthetic experiences (Gabrielsson, 2006; Strange & Taylor, 2008).

Like many literatures in psychology, research on aesthetic chills has an experimental side and an individual differences side. In the experimental side, researchers have examined how features of a work—usually music—affect whether people experience chills. Some studies have examined how aspects of musical structure and dynamics influence chills (Huron & Margulis, 2010). Sloboda (1991), for example, found that people often experienced chills while listening to musical passages with new or unexpected harmonies. Other research has presented music to participants and assessed physiological parameters that might correspond with the experience of chills (Blood & Zatorre, 2001; Grewe, Nagel, Kopiez, & Altenmüller, 2007; Panksepp, 1998).

In the individual differences side, researchers have examined who tends to experience chills. This side has received much less attention than the experimental side. In a notable study, McCrae (2007) examined the relationship between openness to experience and aesthetic chills across cultures. One of the Revised NEO Personality Inventory's items asks about experiencing chills when reading poetry or viewing art. In a data set of 51 cultures, this item correlated with openness to experience in 50 of the 51 cultures, and it had the first or second highest item–total correlation with openness to experience in 32 of the 51 cultures. For the pooled sample as a whole, the aesthetic chills item had the highest item–total correlation of all the openness items. Based on these findings, McCrae suggested that aesthetic chills were a cross-cultural marker of openness to experience.

The Present Research

In the present work, we explored aesthetic chills by using an individual-differences approach. We sought to extend the small individual differences literature, which has to date explored only openness to experience (McCrae, 2007), and to consider how aesthetic chills might relate to other kinds of unusual aesthetic states such as feeling touched, awe, and absorption. People were asked to report how often they experienced a range of unusual aesthetic states, and we collected extensive information about personality, cognitive skills, and experience with the arts. This study

thus illuminates two aspects of aesthetic chills: how it relates to other aesthetic states and how it relates to broader patterns of personality and individual differences.

Method

Participants

A total of 196 young adults enrolled in General Psychology at the University of North Carolina at Greensboro participated and received credit toward a research participation option. Eight people were excluded for extensive missing data or for limited English proficiency, yielding a final sample of 188 people (139 women, 49 men). The average age was 18.7 (range: 18 to 28), and the sample's self-reported ethnicity was primarily Caucasian (58%) and African American (30%).

Procedure

The data were collected as part of a larger study on executive and strategic aspects of creativity, in which people completed a broad range of measures of creativity, personality, intelligence, and individual differences. (No data from this project have been previously published.) People completed the study in groups of 3 to 9. The experimenter explained that the study was about the psychology of creativity and personality, and the participants completed a series of tasks and questionnaires.

To measure aesthetic chills and related states, we presented people with 12 items. People were first asked to write down which area of the arts they encountered most often in their daily life. They then completed the items with reference to that area of the arts, using a 1 (Never or Rarely) to 7 (Nearly Always) scale. The 12 items were developed based on the items, concepts, and descriptions from past work on these states (e.g., Grewe et al., 2007; Konečni, 2005; Sloboda, 1991). The Appendix lists the final 10 items; the two omitted items (as described in the Results) were “feel moved” and “feel a lump in your throat.”

We measured the Big Five personality traits using DeYoung, Quilty, and Peterson's (2007) Big Five Aspects Scale (BFAS). Unlike other scales, the BFAS conceives of each of the five domains in terms of two major aspects, so it provides 10 scores. For openness to experience, for example, the BFAS provides two scores: an intellect score and an openness score. The scale has 100 items that are completed with a 1–5 scale (strongly disagree, strongly agree).

Given that most work on personality and chills uses the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), it's beneficial to measure personality with a different scale—in this case, the BFAS—to extend the evidence for the role of openness to experience in chills: when more than one scale captures the same phenomenon, we can be more sure that the phenomenon actually occurs, rather than being an idiosyncrasy of a measurement tool.

In addition, we chose to use the BFAS because it distinguishes between the Openness facet and the Intellect facet (DeYoung et al., 2007) of Openness to Experience. Johnson (1994) found that the six facets of Openness to Experience on the NEO-PI-R are best represented by just two of the dimensions: Ideas and Aesthetics, or as Johnson (1994) puts it, truth and beauty. A later study (Jang et al., 2002) expanded this idea using behavioral genetics to indicate that two genetic factors explain the shared variance of each Big Five factor. DeYoung (DeYoung, Peterson, & Higgins, 2005; DeYoung et al., 2007; DeYoung, Shamosh, Green, Braver, & Gray, 2009) has advocated for a two-factor structure of domain aspects in several studies using fMRI scans, working memory assessment, and personality inventories, which support the factoring of the Big Five aspects of Openness to Experience into an Openness factor (representing aesthetics, creativity, and emotional sensitivity) and an Intellect factor (representing quick thinking, understanding, and embracing complex problems and ideas). The BFAS thus affords a more differentiated assessment of openness to experience.

We measured fluid intelligence with four tasks: (1) 18 items from the Raven's Advanced Progressive Matrices (12 minutes); (2) a 10-item Paper Folding Task (4 minutes), which requires people to imagine what a paper square would look like if folded, punched with holes, and then unfolded; (3) a 16-item Letter Sets Task (4 minutes), which requires people to identify which set of letters deviates from a rule followed by other sets; and (4) a 22-item Cube Comparisons Task (3 minutes), which requires people to decide whether two cubes could be the same or must be different. The first three tasks have been used in our past work (Silvia, 2008; Silvia & Sanders, 2010).

Finally, we measured experience with the arts in several ways. People completed Smith and Smith's (2006) aesthetic fluency scale, a 10-item scale that measures expertise in the arts by assessing familiarity with people, terms, and ideas from art history. This scale has worked well as a marker of expertise in past work (Silvia, 2007; Silvia & Barona, 2009, Study 2). We also asked people to list all of their college majors, minors, and program concentrations; we then classified each person as having a conventional college major (scored 0) or a creative college major (scored 1). Although rough, this variable conveys information about people's creative goals and occupational aspirations, and it has consistently predicted divergent thinking, a marker of creativity, in our past work (Silvia et al., 2008; Silvia, Martin, & Nusbaum, 2009). Around 11% of the sample had a creative college major, which is similar to a prior sample (around 9%; Silvia et al., 2008).

Results

Data Reduction and Model Estimation

We estimated the statistical models with maximum likelihood estimation with robust standard errors, using Mplus 6. Fluid intelligence was modeled as a latent variable, with the path to the Raven's task fixed to 1. The 10 Big Five aspects measured by the BFAS and the aesthetic fluency

scale were treated as observed scores because our final sample size (n = 188) is probably too small to accommodate a model with many latent predictors.

Factor Structure of Aesthetic Experience Items

We first explored the factor structure of the aesthetic experience items. We weren't committed a priori to a particular structure, so we conducted exploratory factor analyses (EFA) using Mplus 6. Table 1 shows the descriptive statistics for the final 10 items, including the percentage of people who endorsed each response option. Many of the items were non-normal, and most had heavy tails at one end, so we modeled them as ordinal variables with 7 response categories. An ordinal EFA with a direct oblimin (oblique) rotation suggested retaining three factors and dropping two items. One item, “feel a lump in my throat,” failed to load strongly on any factor; another item, “feel moved,” had strong cross-loadings on two factors.

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The final factor structure was coherent and easy to interpret. The first factor, a chills factor, was made up of “feel chills down your spine,” “feel like your hair is standing on end,” and “get goose bumps.” The second factor, a touched factor, was made up of “feel touched” and “feel like crying.” The third factor, an absorption factor, was made up of “feel absorbed and immersed,” “completely lose track of time,” “feel like you're somewhere else,” “feel detached from your surroundings,” and “feel a sense of awe and wonder.”

The three factors correlated strongly with each other. Chills correlated with touched (r = .41) and absorption (r = .45), and touched and absorption correlated with each other (r = .50). This pattern implies that they may share a global, higher-order factor that represents a tendency to experience such states. We estimated a confirmatory factor analysis (CFA) with three lower-order latent variables corresponding to the factors identified in the CFA; the factor variances were fixed to 1, and the two items for the touched factor were constrained to be equal. A higher-order aesthetic-experience factor was then formed that predicted each of the three lower-order factors; the path to the chills factor was fixed to 1. As in the EFA, the items were modeled as ordinal variables. The lower-order factors loaded strongly on the higher-order factor (chills = .70, touched = .78, absorption = .76). Table 1 shows the pattern of standardized loadings for the items on the lower-order factors. (Note that most of the traditional CFA fit indices are not available for ordinal CFA models.)

Predicting Global Aesthetic Experience

So far, we have found that the aesthetic-experience items form coherent subscales and that a higher-order factor seems to explain the covariance of the lower-order factors. Does this broad factor have any substantive meaning? We estimated a series of models that explored how other variables predicted people's tendency to experience the aesthetic states represented by the higher-order factor.

Our first model examined personality as a predictor of aesthetic experience. Aesthetic experience, the outcome, was specified as a higher-order latent variable as described earlier. All 10 aspects of the Big Five were the predictors. Overall, the five factors explained 48.4% of the variance in aesthetic-experience scores, which indicates that the major dimensions of personality account for nearly half of the variability in people's self-reported tendency to experience these aesthetic states. Table 2 shows the pattern of effects. As expected based on McCrae's (2007) research, openness to experience significantly predicted aesthetic experience. Both facets, in fact, had significant effects in opposite directions. People high on the openness facet had higher aesthetic experience scores, whereas people high on the intellect facet had lower aesthetic experience scores. No predictions had been made about the other four domains, but notable effects appeared for several other factors (see Table 2).

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Our second model considered intelligence, demographics, and experience with the arts as predictors. In this model, fluid intelligence, aesthetic fluency, the creativity of people's college major (scored 0 for conventional major, 1 for creative major), and gender (scored 0 for men, 1 for women) were predictors. Creative college major and gender were categorical variables, so their effects are Y-standardized: the regression weights indicate the standard-deviation difference between the groups (Long, 1997). Overall, this model explained 12.9% of the variance in aesthetic experience scores (see Table 2). Aesthetic fluency and gender significantly predicted aesthetic experience scores, but fluid intelligence and college majors didn't. People high in aesthetic fluency and women had relatively higher scores; the significant effect for gender indicated that men and women differed by about half a standard deviation.

Predicting the Lower-Order Chills, Touched, and Absorption Factors

For most researchers, the chills, touched, and absorption subscales are perhaps more interesting than the global factor, so a second series of models explored relationships with the three lower-order subscales. As before, our first model estimated how the 10 aspects of the Big Five predicted chills, touched, and absorption scores. The three subscales were included as outcomes in the same model, and they were modeled as latent variables. The Big Five aspects explained 27.6% of the variance in chills, 34.2% of the variance in touched, and 33.7% of the variance in absorption. Table 3 displays the individual effects. As with the global factor, the openness facet of openness to experience emerged as a notable predictor of all three subscales, although its effects were strongest for the chills and absorption subscales. The touched subscale's strongest predictor was the compassion facet of agreeableness.

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Our second model included fluid intelligence, aesthetic fluency, the creativity of people's college major, and gender as predictors of the three subscales. This model explained 4.7% of the variance in chills, 12.2% of the variance in touched, and 11% of the variance in absorption.

Table 3 displays the individual effects. As before, fluid intelligence and college majors didn't significantly predict scores for any of the subscales. Aesthetic fluency significantly predicted the chills and absorption subscales, and gender significantly predicted the touched subscale; the gender effect indicated that women were three fourths of a standard deviation higher than men.

A Descriptive Analysis of Domains

We had asked people to respond to the aesthetic experience items according to the area of the arts they encountered the most often in daily life, and people listed what this domain was before completing the items. The domains chosen by the participants were diverse. We classified the domains into categories, which are shown in Table 4. By far, the most common category was listening to music, followed by motion picture media (primarily TV and movies). Combined, these two domains accounted for around 64% of the sample. The remaining categories had relatively low frequencies, and several categories reflected noncompliance, such as mentioning more than one domain, mentioning a creative activity (e.g., performing music rather than listening to it), or mentioning something bizarre.

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General Discussion

Aesthetics research has focused on feelings of pleasure and on discrete emotions, so our knowledge of intriguing states like chills is underdeveloped. In the present research, we explored individual differences in aesthetic chills, particularly how chills relate to other unusual states and what people who report frequently experiencing chills are like. First, how did chills relate to other states? In a set of items that described unusual aesthetic experiences, we found a coherent chills factor, and this factor had moderate correlations (r = .41 and r = .45) with two clusters of states: a tendency to feel touched and a tendency to feel absorbed and immersed. The three clusters covaried significantly, so a global higher-order factor could describe their interrelations. At the same time, many differences emerged when the three factors were examined individually, and we imagine that most researchers would view these as distinct kinds of aesthetic experience.

Second, what are people who experience chills often like? Overall, we found that personality was a more important predictor of chills than intelligence and background factors. People high in openness to experience, notably its openness facet rather than its intellect facet, indicated experiencing aesthetic chills significantly more often. According to DeYoung and others (DeYoung et al., 2005, DeYoung et al., 2007, DeYoung et al., 2009; Johnson, 1994), the Openness facet is most similar to McCrae's Openness to Experience evaluated by the NEO-PI-R (Costa & McCrae, 1992), reflecting traits like appreciation for beauty and emotional sensitivity. Not surprisingly, this facet also predicts the likelihood that a person experiences chills better than DeYoung's Intellect facet (DeYoung et al., 2007), which had a significant negative effect. This finding—a positive effect for Openness but a negative effect for Intellect—both replicates

McCrae's (2007) work on Openness to Experience and supports DeYoung's distinction between Openness and Intellect aspects of Openness to Experience.

Of the 10 aspects of the Big Five, openness had the highest effect size (standardized regression weight) for aesthetic chills (.39), absorption (.51), and the global aesthetic experience factor (.49); the compassion aspect of agreeableness had the highest effect size for the touched subscale (.47). The findings for openness thus support McCrae's (2007) contention that aesthetic chills are a central marker of individual differences in openness to experience. Our research used a measurement approach that is rooted in a different tradition of Big Five research than McCrae's research, so the relationship between chills and openness appears to be robust.

Beyond personality, the only consistent predictor was aesthetic fluency, the self-report scale of knowledge about the arts (Smith & Smith, 2006). Fluid intelligence and the creativity of people's college majors had little to do with aesthetic chills scores; gender primarily predicted feeling touched rather than chills. A large literature shows that expertise moderates many aesthetic processes, such as how people perceive, understand, evaluate, and experience art (Hekkert & van Wieringen, 1996a, Hekkert & van Wieringen, 1996b; Locher, Smith, & Smith, 2001; Parsons, 1987; Silvia, 2006; Silvia & Berg, in press). People with more expertise in the arts reported feeling aesthetic chills more often, but it remains for future work to discern why. One straightforward possibility is that people with more expertise engage with the arts more often. College students scoring high in aesthetic fluency tend to have majors related to the arts, so their higher incidence of chills might stem from their deeper and more frequent aesthetic encounters, not from more knowledge per se.

Most of the work on aesthetic chills has been experimental, such as studies that play music excerpts that vary on important dimensions and then measure the experience of chills (Huron & Margulis, 2010). A valuable direction for future work would be to intersect the experimental paradigms with an assessment of individual differences. As Grewe et al. (2009) point out, the search for physiological markers of aesthetic chills has been hampered by the massive between-person variability in chills experience. In their study of chills while listening to music, for example, about a third of the participants experienced no chills at all but many other participants experienced a lot, including someone who reported 88 chills. Incorporating individual differences—particularly openness to experience, a strong predictor of chills in our work and in McCrae's (2007) work—could help researchers reduce the between-person error variance and illuminate how traits and states jointly influence this intriguing response to the arts.

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Appendix

Appendix A: Aesthetic Experiences Scale

How often do you…

_____ feel absorbed and immersed

_____ completely lose track of time

_____ feel chills down your spine

_____ get goose bumps

_____ feel like you're somewhere else

_____ feel like your hair is standing on end

_____ feel like crying

_____ feel touched

_____ feel detached from your surroundings

_____ feel a sense of awe and wonder