In Your Face(t)—Personality Traits Interact With Prototypical Personality Faces in Economic Decision Making

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In everyday life, assumptions about our peers’ as well as our own personality shape social interactions. We investigated whether self-rated personality and inferences drawn from partners’ faces influence economic decisions. Participants (N = 285) played the trust game in the role of the trustor as well as the ultimatum game in the role of the proposer and interacted with trustees and receivers represented by prototypical personality faces. Participants also evaluated both their own traits and the personality of the faces. In the trust game, trustees represented by faces rated higher on agreeableness yielded higher transferred amounts. This effect was more pronounced for trustors low on dispositional trust, whereas trustors high on dispositional trust did not relate their decisions to the faces. Trustees represented by faces rated higher on conscientiousness yielded higher transferred amounts only for trustors high on dispositional anxiety. In the ultimatum game, receivers represented by faces rated higher on conscientiousness yielded lower offers only for proposers high on dispositional assertiveness. These results extend previous findings on the inferences drawn from facial features and the influence of personality on decision making. They highlight the importance of considering the personality of both interaction partner, as well as potential interactions of players’ traits.

Keywords: big five, personality, trust game, personality face aurus, ultimatum game

1. INTRODUCTION

People are willing to cooperate with each other as long as they can mutually benefit from the results (Tomasello, 2018). Thus, interpersonal trust is an essential factor in building cooperative relationships with other individuals (Ross and Lacroix, 1996). Positive experiences invalidate the repeated critical questioning of interaction partners and trust increases our efficiency substantially (Yamagishi, 2011). However, the willingness to cooperate and trust others also carries a risk, as others can use the given trust to their own advantage. In social interactions, individuals might have theories about how the personality of others affects their behavior. These theories are less accurate than people think and are therefore only partially suitable for predicting actual behavior (Cooper et al., 2015). Nonetheless, available information about the counterpart is still used and influences decisions on cooperative behavior (Cooper et al., 2015). With unknown persons, we cannot rely on our previous experiences. Thus, the trustworthiness has to be evaluated based on behavior, gestures, facial expressions, and physical appearance. Without prior information, individuals have already formed a stable assessment of trustworthiness after 33 ms (Todorov et al., 2009), which does not differ significantly from a viewing time of 30 s (Porter et al., 2008). In this context, independent raters agree strongly on their assessments (Rule et al., 2013).
1.1. Personality Inferred From Faces
According to the Realistic Accuracy Model (Funder, 1995), personality traits are real attributes of individuals that can be identified through various channels. The perception of the characteristics could ultimately form the basis for later preferences for certain interaction partners. Such conclusions can be drawn even without knowing the person (Ambady et al., 1995), by a short exposition via video (Borkenau et al., 2004), and facial expressions (Naumann et al., 2009). Passini and Norman (1966) investigated how good people are at assessing the personality of unknown people in a face-to-face test design (zero acquaintance). Significant matches were found between self and other people's ratings on the scales of extraversion, conscientiousness, and openness, which could be replicated for extraversion and conscientiousness (Albright et al., 1988).

Others presented even less information to their participants, as only photos of unknown faces were shown. Nevertheless, there was some agreement between the external assessment and the self-reported values of extraversion (Rule et al., 2013). The efficiency of such an extraction of personality traits from faces was demonstrated as such inferences occur within 50–150 ms after exposure, especially for extraversion (Borkenau et al., 2009). However, evidence in favor of the view that trustworthiness (Efferson and Vogt, 2013; Vogt et al., 2013; Bonnefon et al., 2017; Jaeger et al., 2020a) or Big Five traits (Shevlin et al., 2003; Borkenau et al., 2009; Ames et al., 2010; Jones et al., 2012; Satchell et al., 2019; Jaeger et al., 2020b) can be accurately judged based on features of a person's facial appearance is rather mixed, with many studies reporting null results and also many inconsistencies regarding which traits can and cannot be inferred between studies.

Here, we want to investigate to what extent personality traits inferred from faces serve as predictors of cooperation in economic games.

1.2. Personality and Economic Decision Making
The broader personality of interaction partners also plays a key role. Agreeable individuals show more trusting behavior, whereas neurotic individuals show less trusting behavior (Müller and Schwieren, 2012). High levels of agreeableness are also associated with an allocation of higher amounts of money in the dictator game (Lee and Ashton, 2004; Baumert et al., 2014). Moreover, perceivers are sensitive to others' agreeableness as it signals cooperation and reciprocity (Buss, 1996). Therefore, it might be advantageous to choose interaction partners that are particularly agreeable (Ben-Ner and Haldorsson, 2010). The widely used model for measuring personality is the Five Factor Model or Big Five. In addition to the five overarching factors, there are facets that make up the factors (Costa and McCrae, 2008). We recently matched self and interviewer ratings on all Big Five facets and related them to economic decision making and found that the facets trust, altruism, and sympathy (factor agreeableness), gregariousness and assertiveness (factor extraversion), anxiety (factor neuroticism), and cautiousness (factor conscientiousness) significantly predicted decision making in the trust game (TG) and ultimatum game (UG; Weiß et al., 2021). In real life, potential cooperation partners are often unacquainted but cannot rely on questionnaires or interviews for personality assessment.

To operationalize our research question, two paradigms associated with trust and willingness to cooperate were selected. On the one hand, we chose the TG (Berg et al., 1995). Two players are each assigned a role, that of the trustor or that of the trustee. In both roles, the players receive an endowment of €10, although this may vary depending on the design of the study. In the first phase, the trustor has the possibility to send the trustee any amount of his/her money. If sent, the amount is tripled by the trustee. In the second phase, the trustee can send any amount back to the trustor; this amount is not tripled. Trust as a construct is measured in the first phase. Both the trusting behavior of the trustor and the perceived trustworthiness of the trustee can be conceived as the amount sent and thus entrusted. The actual trustworthiness and the reciprocity of the trustee can be quantified via the returned money in the second phase. According to the emancipation theory of trust (Yamagishi, 2011), high levels of trust encourage individuals to form new relationships with others. Having high trust enables a person to recognize the trustworthiness of others (Hashimoto et al., 2020), but also to detect lies (Carter and Weber, 2010). For example, high trusting individuals were more skilled at predicting who had made a cooperative choice in a prisoner's dilemma after a brief face-to-face interaction (Kikuchi et al., 1997).

In previous studies, agreeableness predicted trust behavior (Mooradian et al., 2006; Müller and Schwieren, 2012), while conscientiousness and neuroticism predicted less trusting behavior (Evans and Revelle, 2008; Müller and Schwieren, 2012). On the facet level, we found that the facets trust (factor agreeableness), anxiety (factor neuroticism), and cautiousness (factor conscientiousness) predicted trustor decision making in the TG (Weiß et al., 2021). Trustee behavior likewise was predicted by neuroticism, agreeableness as well as conscientiousness. Another predictor of trustworthiness is machiavellianism, as individuals scoring high on Machiavellianism acted selfishly as trustees (Gunnthorsdottir et al., 2002).

In addition, we used the UG (Güth et al., 1982), which also comprises two roles. The proposer receives an amount of money which s/he splits between him-/herself and the receiver. The receiver can now accept or reject this offer. By rejecting the offer, neither of the two parties receives anything. If the receiver accepts the offer, the money is divided as suggested by the proposer. Despite or even because of its simplicity, it is a frequently used scenario, since it contains many analogies from the real world, such as salary negotiations. According to the economic theory of self-interest, the receiver would accept any offer greater than zero and the propose would offer the lowest amount possible (Rubinstein, 1982). Yet, experimental studies have provided compelling evidence that receivers and proposers engage in actions that are not consistent with theoretical predictions (Miljkovic, 2005; Hewig et al., 2011; Fiori et al., 2013; Kruis et al., 2020). One reason for this inconsistency could be that individuals care about the welfare of others and are generous due to altruistic motives (Kahneman et al., 1986; Thaler, 1988).
Few consistent results have been available to date on the Big Five and the behavior of the proposer in the UG. Honesty-Humility from the HEXACO personality model (Lee and Ashton, 2004) predicted benevolent behavior of the proposers while agreeableness from the Big Five model predicted higher acceptance rates of the receiver (Hilbig et al., 2012).

Although relations between personality and behavior in social decisions have been demonstrated, the mechanisms are still unclear. More specific measures than the Big Five factors might be better suited to predict behavior. Therefore, we used the facets of the Big Five factors as means for more accurate predictions. In our previous study (Weiß et al., 2021), we found that the facets sympathy (factor agreeableness), gregariousness, and assertiveness (factor extraversion) predicted proposer decision making in the UG, whereas receiver decisions were predicted by extraversion, neuroticism as well as conscientiousness. Interestingly, altruism (a facet of the factor agreeableness) did not predict behavior for both players.

We are aware that multiple economic preferences play a role in these games (e.g., risk aversion, social preferences, betrayal aversion). Nevertheless, we leave the question open for future research, to what extent different motives might explain additional variance to the parameters used in this study.

1.3. The Present Study
To stereotypically represent personality traits, we used composite faces from the Personality facceaurus (Holtzman, 2011). The faces were created by superimposing the faces of individuals with self- and other-ratings high or low on a particular trait. This works particularly well with the factors conscientiousness and extraversion (Little and Perrett, 2007). Another recent study (Alper et al., 2021) showed that agreeableness and conscientiousness are correctly inferred, while extraversion is correctly inferred in women. For our study, we chose prototypical faces for all Big Five factors (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness). In addition, we also chose traits where individuals with high values should be avoided when making cooperation decisions, such as the Dark Triad (i.e., Psychopathy, Machiavellianism, Narcissism) as well as Dominance and Submissiveness from the interpersonal circumplex model (DeYoung et al., 2013). Trust in individuals with extreme levels of these traits can be particularly risky, as they are often selfish and manipulative. In studies with prototypical composite faces, it was shown that people can recognize the personality traits of the Dark Triad in people only by their faces (Holtzman, 2011; Alper et al., 2021).

In conclusion, consensual inferences regarding personality traits are drawn from the physiognomy. These inferences in turn influence decisions in social and economic contexts. Therefore, the present study combines the findings that our personality influences decision making and that inferences about someone else’s personality are drawn from their facial features, even from static photographs, and thus can have an impact on our economic decision making.

We expect self-rated trust as well as lack of cautiousness and anxiety as predictive facets for trusting behavior of the trustor in the TG. For the UG, we expect self-rated sympathy as well as lack of gregariousness and assertiveness as predictive facets for cooperative behavior of proposers. Regarding the personality of the opposite players, inferred from the composite faces, we expect the perceived agreeableness, conscientiousness, as well as lack of neuroticism, and Machiavellianism to be predictive for trusting behavior of the trustor in the TG. For the UG, we expect the perceived conscientiousness as well as lack of extraversion and neuroticism to be predictive for cooperative behavior of proposers.

To our knowledge, there are no studies yet investigating whether personality traits of players in economic games interact in their prediction of behavior. Based on the literature for more general social relationships (Dijkstra and Barelds, 2008; Montoya et al., 2008; Sacco and Brown, 2018), both similarity and complementarity hypotheses are plausible. Many studies have examined relationships between personality traits and behavior (Brandstätter and Königstein, 2001; Müller and Schwieren, 2012), and between facial impressions and behavior (Csikly et al., 2011; Mussel et al., 2013; Weiß et al., 2020). However, only a few if any studies have examined the interaction (Jaeger et al., 2020a). Recent studies suggest that when forming personality impressions from faces, the interaction between the appearance of the target and the characteristics of the perceiver can explain a lot of variance in impressions (Hehman et al., 2017, 2019). Specifically, impressions can be goal directed, such that very different perceivers reach similar impressions for the same target (Hehman et al., 2017). Conversely, some impressions may be particularly perceiver driven, such that differences between perceivers are largely responsible for variation in ratings rather than the targets themselves (Hehman et al., 2017). Evidence from research addressing different perceivers, social categories, and contexts indicates that impressions are formed in a nuanced, complex, and highly variable manner across different situations (Stolier et al., 2018). Consequently, we believe that interactions in economic decision making might be a relevant context facilitating the emergence of complex interactions between personality traits of perceivers and targets.

2. METHODS
2.1. Sample
The experiment was performed with the online questionnaire platform SoSciSurvey (Leiner, 2020). Participants were recruited via SONA Systems and consisted of students of psychology, students of other disciplines as well as non-students. They participated voluntarily in the present study and students of psychology received course credit. The sample comprises 285 participants (67% female; $M_{\text{age}} = 30.86, SD_{\text{age}} = 15.12$).

2.2. Stimulus Material and Rating Scales
To assess Big Five personality factors, a translated version of the IPIP-NEO-120 (Johnson, 2014) was used. For each of the five factors, openness ($\omega = 0.70$), conscientiousness ($\omega = 0.74$), extraversion ($\omega = 0.82$), agreeableness ($\omega = 0.77$), and neuroticism ($\omega = 0.84$), there are six facets, each of them with four items. Participants indicated their agreement regarding each
3. RESULTS

3.1. Manipulation Check

To examine whether individuals perceived faces as being different from each other, we compared the trait ratings for high- and low-rated prototype personality faces according to the Personality Faceaurus (Holtzman, 2011) with pairwise t-tests. The trait ratings for supposedly high agreeableness, conscientiousness, extraversion, and Machiavellianism faces were significantly higher as compared to the lower rated faces (all values of $p \leq 0.001$). However, for neuroticism faces, the lower faces were rated as being more representative of neuroticism as compared to the higher rated faces ($p = 0.066$). For the faces, which were not relevant for our hypotheses, trait ratings were significantly higher for the higher rated faces as compared to the lower rated faces (all values of $p \leq 0.001$), except for openness, which showed an opposite pattern ($p \leq 0.001$).

We used Hierarchical Linear Modeling (Raudenbush et al., 2011) to analyze the influence of prototype personality faces (level 1), self-rated personality (level 2) as well as their cross-level interaction on decision making. We separately analyzed the target traits in each of the two games (see Supplementary Material for descriptive statistics and correlations).

Level 1 modeled the within-subjects variability by predicting the transferred amount in the TG and UG from the trial number, the outcome of the preceding trial, and the trait rating of the respective prototype face. Level 2 modeled between-subject variability by predicting the individual participants' coefficients from the participant means of level 1 predictors as well as the self-rated participant facet scores. All predictors were entered as standard scores ($M = 0$, $SD = 1$).

3.2. Trust Game

3.2.1. Findings for Level-1 Predictors

In a preliminary analysis, we ran a model without any trait ratings as predictors to establish the within-person and the between-person variance components. The results of these analyses are reported in the first data column of Table 1. For the TG, within-person variability was roughly three times the size of the between-person variability, indicating a larger variability across the different faces compared to participants.

Coefficients for level-1 predictors of the full models are reported in the second data column of Table 1. Across the four faces differing in agreeableness, the mean transferred amount was €5.46. Importantly, for faces with an agreeableness rating one standard deviation above the mean, the amount increased by €0.16. Across the four faces differing in conscientiousness, the mean transferred amount was €5.56. There was a trend toward higher transferred amounts for faces rated high on conscientiousness. For the faces differing in neuroticism and Machiavellianism, the mean transferred amount was €5.59 and €5.58, respectively. There were no differences regarding the face ratings.

3.2.2. Findings for Level-2 Predictors

Coefficients for self-rated personality traits (level-2) are reported in the last three data columns of Table 1. We found an effect of self-rated personality traits only for the Machiavellian faces. For participants with a self-rated trust facet one standard deviation above the mean, the transferred amount increased by €0.18.
3.2.3. Findings for Cross-Level Interactions
There was an interaction of the trait rating of prototypical agreeableness faces (level 1) and self-rated trust (level 2). The effect of the faces differing in their agreeableness rating (on average €0.16 for a difference of one standard deviation, see above) decreased by €0.21 for individuals with high self-rated trust, effectively nullifying the effect of the prototypical faces. For participants with self-rated trust one standard deviation above the mean, however, the effect of the faces more than doubled to €0.37, indicating higher trusted amounts to trustees rated higher on agreeableness especially for participants low on dispositional trust (see Figure 1).

There was also an interaction of the trait rating of prototypical conscientiousness faces (level 1) and self-rated assertiveness (level 2). Whereas, the effect of the faces (€0.14) failed to reach significance across all participants, for participants with self-rated anxiety one standard deviation above the mean the effect of the faces increased by €0.19, indicating an effect of the faces only of highly anxious participants.

3.3. Ultimatum Game
3.3.1. Findings for Level-1 Predictors
Again, we ran a model without any trait ratings as predictors to establish the within-person and the between-person variance components. The results of these analyses are reported in the first data column of Table 2. For the UG, within-person variability was roughly two times the size of the between-person variability, again indicating a larger variability across the different faces compared to participants.

Coefficients for level-1 predictors of the full models are reported in the second data column of Table 2. For the faces differing in conscientiousness, extraversion, and neuroticism, the mean transferred amount was €4.39, €4.38, and €4.37, respectively. There were no differences in offered amounts due to the face ratings.

3.3.2. Findings for Level-2 Predictors
Coefficients for self-rated personality traits (level-2) are reported in the last three data columns of Table 2. There were no effects of self-rated personality traits on the intercepts, i.e., the offered amounts averaged across faces.

3.3.3. Findings for Cross-Level Interactions
There was an interaction of the trait rating of prototypical conscientiousness faces (level 1) and self-rated assertiveness (level 2). While there was no effect of the faces (€−0.06) across all participants, for participants with self-rated assertiveness one standard deviation above the mean the effect of the faces

| Table 1 | Coefficients (robust standard errors) for fixed effects of entrusted amount in the trust game. |
|---|---|---|---|---|---|---|---|---|
| Face | VC Intercept | Self-rated personality facet | Aggregated level 1 predictors | Trait rating | Trust | Cautiousness | Anxiety |
| Agreeableness | | | | | | | | |
| Intercept | 1.32 | 5.46 (0.09) | −0.65 (0.19) | 2.49 (0.13) | 0.05 (0.16) | −0.10 (0.08) | 0.14 (0.09) | −0.06 (0.09) |
| Trial | 0.07 | 0.13 (0.07) | −0.29 (0.17) | 0.05 (0.10) | −0.04 (0.14) | 0.07 (0.07) | −0.07 (0.07) | −0.11 (0.07) |
| Outcome | 0.25 | 0.67 (0.10) | −0.65 (0.20) | −0.32 (0.13) | 0.14 (0.14) | 0.04 (0.08) | −0.04 (0.08) | −0.10 (0.08) |
| Trait rating | 0.16 (0.08) | 0.10 (0.17) | −0.05 (0.14) | 0.03 (0.13) | −0.21 (0.08) | 0.03 (0.08) | −0.04 (0.08) |
| Level 1 residuals | 3.89 | | | | | | | |
| Conscientiousness | | | | | | | | |
| Intercept | 1.2 | 5.56 (0.09) | 0.03 (0.21) | 2.53 (0.13) | −0.14 (0.16) | 0.09 (0.09) | −0.09 (0.09) | −0.10 (0.09) |
| Trial | 0.16 | −0.06 (0.07) | 0.05 (0.17) | 0.37 (0.11) | 0.17 (0.15) | −0.06 (0.07) | −0.04 (0.08) | −0.08 (0.08) |
| Outcome | 0.44 | 0.48 (0.11) | −0.05 (0.18) | −0.06 (0.14) | 0.01 (0.18) | −0.21 (0.08) | −0.10 (0.09) | −0.06 (0.09) |
| Trait rating | 0.14 (0.09) | 0.04 (0.19) | 0.03 (0.14) | 0.14 (0.18) | −0.04 (0.08) | 0.07 (0.10) | 0.19 (0.10) |
| Level 1 residuals | 3.92 | | | | | | | |
| Neuroticism | | | | | | | | |
| Intercept | 1.16 | 5.59 (0.09) | 0.06 (0.17) | 2.60 (0.15) | 0.12 (0.15) | 0.10 (0.09) | −0.07 (0.09) | −0.08 (0.09) |
| Trial | 0.06 | 0.03 (0.07) | −0.26 (0.16) | 0.09 (0.12) | 0.01 (0.11) | 0.05 (0.06) | 0.18 (0.06) | 0.01 (0.07) |
| Outcome | 0.36 | 0.65 (0.10) | −0.22 (0.20) | −0.33 (0.13) | −0.19 (0.13) | −0.09 (0.09) | 0.02 (0.08) | 0.08 (0.10) |
| Trait rating | 0.07 (0.09) | −0.09 (0.16) | −0.08 (0.11) | 0.01 (0.15) | 0.02 (0.08) | 0.02 (0.09) | 0.08 (0.09) |
| Level 1 residuals | 4.06 | | | | | | | |
| Machiavellianism | | | | | | | | |
| Intercept | 1.20 | 5.58 (0.09) | −0.15 (0.17) | 2.37 (0.13) | −0.23 (0.14) | 0.18 (0.09) | 0.05 (0.08) | −0.09 (0.09) |
| Trial | 0.04 | 0.07 (0.07) | −0.18 (0.18) | 0.04 (0.11) | 0.06 (0.11) | 0.08 (0.07) | −0.04 (0.08) | −0.10 (0.07) |
| Outcome | 0.47 | 0.61 (0.09) | −0.17 (0.21) | −0.19 (0.15) | −0.38 (0.13) | 0.12 (0.10) | −0.09 (0.09) | 0.06 (0.10) |
| Trait rating | 0.05 (0.09) | 0.21 (0.21) | 0.13 (0.14) | 0.21 (0.17) | 0.11 (0.09) | −0.05 (0.09) | −0.01 (0.10) |
| Level 1 residuals | 3.77 | | | | | | | |

Level 1 predictors (participants-centered) included the trial number, outcome in previous trial, and trait rating of the trustee’s face. Level 2 predictors included participant means of level 1 predictors as well as participants’ facet scores as simultaneous predictors.

N = 285, approx. d.f. = 278. VC variance components, estimated in separate models without trait ratings as predictors. Significant coefficients (p < 0.05, one-tailed tests) are printed bold.
decreased by €0.13, indicating lower offers of highly assertive participants for faces of more conscientiously rated receivers.

4. DISCUSSION

We were interested whether personality as well as inferences drawn from faces influence economic decisions. For this purpose, we let the participants play as trustor (TG) and proposer (UG), interacting with partners (trustee and receiver, respectively) represented by prototypical personality faces. To assess personality, the participants evaluated both their own traits and the personality of the faces. In both games, we found more variance in decision making within participants, i.e., across faces, than between participants. This suggests that in one shot, zero acquaintance interactions information about players inferred from their faces potentially outweigh player dispositions.

We confirmed one of the hypothesized effects of the faces. In the TG, trustees represented by faces rated higher on agreeableness yielded higher transferred amounts. Interestingly, this effect was present for trustors from average to low dispositional trust, whereas only trustors high on dispositional trust did not relate their decisions to the faces. This extends previous literature on perceived trustworthiness (Stirrat and Perrett, 2010; Rezlescu et al., 2012; Bonnefon et al., 2013, 2017; De Neys et al., 2015), as well as the influence of personality on trust decisions (Ben-Ner and Halldorsson, 2010; Müller and Schwieren, 2012), as it highlights the potential importance of interactions of players’ traits. Hashimoto and colleagues discussed that individuals with low levels of dispositional trust aim to protect themselves from possible exploitation and are therefore highly suspicious of interaction partners (Hashimoto et al., 2020). Our results suggest that these individuals may benefit from others whom they perceive as particularly agreeable. There was a second cross-level interaction for the hypothesized influence of faces differing in conscientiousness. While the faces’ main effect was marginally significant, there was a significant interaction with self-rated anxiety. There is evidence that in a repeated TG anxiety can lead to deficits in building trust (Aimone et al., 2014), but it seems plausible that this effect is reversed when the partners are perceived as particularly conscientious.

Interestingly, we failed to replicate some previously reported effects (Brandstätter and Königstein, 2001; Evans and Revelle, 2008) of self-rated personality on decision making in both games. One speculative explanation is that the prototypical faces might reduce the influence of the participants’ own traits on decisions. Another reason is the use of standard personality questionnaires. In our previous study (Weiβ et al., 2021), we used interviews in addition to questionnaires for personality assessment, capturing more extreme trait levels compared to only questionnaires. Interestingly, a lack of trust is associated with personality disorders, e.g., borderline (King-Casas et al.,...
whereas trust is more like a default in the average personality range (e.g., > 75% trusting decisions in binary TGs among undergraduate students; Smith, 2003).

Main effects of the faces or personality facets were absent in the UG. This is in line with observation of only minimal influence of proposer personality in the UG and other economic games (Ruch et al., 2017). Another explanation might be that individuals do not want to risk their offer being rejected in the UG. This strategic component, i.e., the fear of rejection, is possibly dominant and could therefore outweigh the influence of personality traits on proposer behavior. However, we could show that trait assertiveness is associated with decreasing offers for receivers represented by conscientiousness faces. A possible explanation lies in the definition of conscientiousness as “socially prescribed impulse control that facilitates task- and goal-directed behavior” (John and Srivastava, 1999, p. 121) and higher performance on tasks (Barrick and Mount, 1991). Presumably, individuals with high assertiveness find it easier to exploit conscientious individuals, expecting them to earn rewards elsewhere due to their goal-directed nature.

In summary, we found benefits of prototypical agreeable faces in the TG for trusting behavior, while in the UG faces had no direct impact on behavior.

Our study is of course not without limitations. Future studies may modify the paradigm at several crucial points. Repeated rather than one-shot interactions could investigate the time course and potential updating of inferred trait rating of game partners. This would allow an interaction of face and associated outcomes. When compared with random outcomes, faces should not become associated with specific outcome expectations; repeated interaction should thereby diminish face effects over time (Shen et al., 2020). We speculated that absent effects of self-rated personality may be due to the dominant influence of faces. Consequently, a future study could adapt the paradigm both with and without faces. This would allow to compare and relativize the effects of self-rated personality in a game using faces versus a game without faces. Moreover, we used morphed, potentially artificial looking faces, albeit slightly modified to reduce their smoothness. A future study could use actual faces with highly consensual trait ratings. We decided to use feedback after each interaction to increase the believability of the task by making participants think that they are actually interacting with someone. However, this design feature comes at a cost. Participants whose partner in the preceding trial sent back a low lot might be more likely to trust on the next trial compared to participants whose partner did not send back a comparable amount. This might not explain any of the effects in the study as we controlled for the outcome of preceding trials, but it could add noise and reduce the effects of personality and perceived personality.

In conclusion, we showed effects of self-rated as well as inferred personality on decision making in the TG, but not in the UG. Furthermore, both the trait evaluation inferred from faces as well as the self-assessed rating, interacted

### TABLE 2 | Coefficients (robust standard errors) for fixed effects of offered amount in the ultimatum game.

| Face          | VC | Intercept | Trial | Outcome | Rating | Sympathy | Gregariousness | Assertiveness |
|---------------|----|-----------|-------|---------|--------|----------|---------------|---------------|
| Conscientiousness | 0.60 | 4.39 (0.06) | 0.01 (0.11) | 0.49 (0.17) | -0.20 (0.11) | 0.09 (0.06) | -0.06 (0.06) | 0.04 (0.06) |
| Trial         | 0.12 | -0.10 (0.05) | -0.02 (0.12) | 0.07 (0.08) | 0.21 (0.06) | -0.04 (0.05) | 0.00 (0.05) | 0.04 (0.05) |
| Outcome       | 0.24 | 0.02 (0.08) | 0.06 (0.12) | 0.05 (0.16) | -0.05 (0.11) | 0.10 (0.06) | -0.05 (0.06) | 0.02 (0.06) |
| Trait rating  | -0.06 (0.05) | 0.04 (0.11) | 0.01 (0.10) | -0.22 (0.10) | 0.03 (0.05) | 0.00 (0.05) | -0.13 (0.06) |
| Level 1 residuals | 1.42 |
| Extraversion  | 0.57 | 4.38 (0.06) | -0.36 (0.11) | 0.61 (0.13) | 0.11 (0.10) | 0.00 (0.05) | -0.08 (0.06) | -0.08 (0.05) |
| Trial         | 0.19 | -0.08 (0.05) | 0.18 (0.11) | 0.03 (0.11) | -0.04 (0.08) | -0.07 (0.06) | -0.07 (0.06) | 0.07 (0.06) |
| Outcome       | 0.13 | 0.10 (0.08) | 0.06 (0.14) | 0.02 (0.12) | 0.03 (0.09) | -0.04 (0.06) | 0.04 (0.06) | -0.05 (0.05) |
| Trait rating  | 0.03 (0.04) | 0.12 (0.09) | -0.02 (0.08) | -0.10 (0.08) | -0.01 (0.05) | -0.01 (0.06) | -0.07 (0.05) |
| Level 1 residuals | 1.30 |
| Neuroticism   | 0.63 | 4.37 (0.06) | 0.08 (0.11) | 0.25 (0.19) | 0.00 (0.08) | 0.06 (0.05) | -0.06 (0.06) | -0.03 (0.06) |
| Trial         | 0.27 | -0.09 (0.05) | -0.04 (0.12) | 0.12 (0.10) | -0.04 (0.09) | -0.02 (0.05) | -0.04 (0.05) | 0.08 (0.06) |
| Outcome       | 0.19 | -0.08 (0.08) | 0.23 (0.11) | -0.28 (0.16) | -0.16 (0.11) | 0.04 (0.06) | 0.00 (0.09) | 0.06 (0.07) |
| Trait rating  | -0.03 (0.06) | -0.01 (0.10) | -0.22 (0.15) | 0.06 (0.11) | 0.06 (0.06) | -0.04 (0.06) | -0.01 (0.06) |
| Level 1 residuals | 1.23 |

*Level 1 predictors (participants-centered) included the trial number, outcome in previous trial, and trait rating of the receiver’s face. Level 2 predictors included participant means of level 1 predictors as well as participants’ facet scores as simultaneous predictors.*

*N = 285, approx. d.f. = 278. VC variance components, estimated in separate models without trait ratings as predictors. Significant coefficients (p < 0.05, one-tailed tests) are printed bold.*
in their prediction of the game decisions. Notwithstanding a replication of such interactions, future studies should consider and possibly manipulate player and inferred partner personality simultaneously.

DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available in the OSF repository, https://osf.io/ugw7p.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the local ethics committee of the Department of Psychology of the Julius-Maximilians-University of Würzburg (GZ-2020-05). The patients/participants provided their written informed consent to participate in this study.

REFERENCES

Aimeone, I. A., Ball, S. B., and King-Casas, B. (2014). Anxiety, risk preferences, betrayal aversion, and the growth of interpersonal trust. SSRN Electron. J. doi: 10.2139/ssrn.2402413

Albright, L., Kenny, D. A., and Malloy, T. E. (1988). Consensus in personality judgments at zero acquaintance. J. Pers. Soc. Psychol. 55, 387–395. doi: 10.1037/0022-3514.55.3.387

Alley, T. R., and Cunningham, M. R. (1991). Article commentary: averaged faces are attractive, but very attractive faces are not average. Psychol. Sci. 2, 123–125. doi: 10.1111/j.1467-9826.1991.tb00113.x

Alper, S., Bayrak, F., and Yılmaz, O. (2021). All the Dark Triad and some of the Big Five traits are visible in the face. Pers. Individ. Differ. 168:110350. doi: 10.1016/j.paid.2020.110350

Ambsky, N., Hallahan, M., and Rosenthal, R. (1995). On judging and being judged accurately in zero-acquaintance situations. J. Pers. Soc. Psychol. 69, 518–529. doi: 10.1037/0022-3514.69.3.518

Ames, D. R., Kammrath, L. K., Suppes, A., and Bolger, N. (2010). Not so fast: the (not-quite-complete) dissociation between accuracy and confidence in thin-slice impressions. Pers. Soc. Psychol. Bull. 36, 264–277. doi: 10.1177/0146167209354519

Barrick, M. R., and Mount, M. K. (1991). The big five personality dimensions and job performance: a meta-analysis. Personn. Psychol. 44, 1–26. doi: 10.1111/j.1744-6570.1991.tb00688.x

Baumert, A., Schlösser, T., and Schmitt, M. (2014). Economic games: a replication of such interactions, future studies should consider and possibly manipulate player and inferred partner personality simultaneously.

Bonnefon, J. F., Hopfensitz, A., and De Neys, W. (2017). Can we detect betrayal aversion, and the growth of interpersonal trust? Eur. J. Psychol. Assess. 30, 178–192. doi: 10.1016/j.ejpa.2015.01.002

Ben-Ner, A., and Halldorsson, F. (2010). Trusting and trustworthiness: what are they, how to measure them, and what affects them. J. Econ. Psychol. 31, 64–79. doi: 10.1016/j.joep.2009.10.001

Berger, J., Dickhaut, J., and McCabe, K. (1995). Trust, reciprocity, and social history. The Games Econ. Behav. 10, 122–142. doi: 10.1006/game.1995.1027

Bonfetto, J. F., Hopfensitz, A., and De Neys, W. (2017). Can we detect cooperators by looking at their face? Curr. Direct. Psychol. Sci. 26, 276–281. doi: 10.1177/0963721417693352

Bonfetto, J. F., Hopfensitz, A., and Neys, W. D. (2013). The modular nature of trustworthiness detection. J. Exp. Psychol. 142, 143–150. doi: 10.1037/a0028930

Borkenau, P., Brecke, S., Möttig, C., and Paelecke, M. (2009). Extraversion is accurately perceived after a 50-ms exposure to a face. J. Res. Pers. 43, 703–706. doi: 10.1016/j.jrp.2009.03.007

AUTHOR CONTRIBUTIONS

MP conceived the experiment. MW conducted the experiment. MW and MP analyzed the results. All authors contributed to the manuscript.

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SUPPLEMENTARY MATERIAL

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Smith, V. L. (2003). Constructivist and ecological rationality in economics. *Am. Econ. Rev.*, 93, 465–508. doi: 10.1257/000282803322156954

Stirrat, M., and Perrett, D. I. (2010). Valid facial cues to cooperation and trust: male facial width and trustworthiness. *Psychol. Sci.*, 21, 349–354. doi: 10.1177/0956797610362647

Stolier, R. M., Hehman, E., and Freeman, J. B. (2018). A dynamic structure of social trait space. *Trends Cogn. Sci.*, 22, 197–200. doi: 10.1016/j.tics.2017.12.003

Thaler, R. H. (1988). Anomalies: the ultimatum game. *J. Econ. Perspect.*, 2, 195–206. doi: 10.1257/jep.2.4.195

Todorov, A., Pakrashi, M., and Oosterhof, N. N. (2009). Evaluating faces on trustworthiness after minimal time exposure. *Soc. Cogn.*, 27, 813–833. doi: 10.1521/soco.2009.27.6.813

Tomasello, M. (2018). *A Natural History of Human Thinking*. Cambridge, MA: Harvard University Press.

Vogt, S., Efferson, C., and Fehr, E. (2013). Can we see inside? Predicting strategic behavior given limited information. *Evol. Hum. Behav.*, 34, 258–264. doi: 10.1016/j.evolhumbehav.2013.03.003

Weiß, M., Paelecke, M., and Hewig, J. (2021). Economic games as diagnostic tools. Manuscript in preparation.

Weiß, M., Rodrigues, J., Boschet, J., Pittig, A., Mussel, P., and Hewig, J. (2020). How depressive symptoms and fear of negative evaluation affect feedback evaluation in social decision-making. *J. Affect. Disord.* Rep. 1:100004. doi: 10.1016/j.jadr.2020.100004

Yamagishi, T. (2011). *Trust: The Evolutionary Game of Mind and Society*. New York, NY: Springer.

**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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