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Lots of Target Variance: An Update of SRM Using the HEXACO Personality Inventory

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Abstract

According to previous studies based on the Social Relations Model (SRM), most of the variance in observer reports of personality is perceiver and relationship variance, and not much is target variance. However, most SRM studies have employed short adjective scales instead of personality questionnaires. Results based on the HEXACO-PI-R in family and work groups showed high levels of consensus (target variance) and self-other agreement for all traits and, except for Honesty-Humility and Openness to Experience, low levels of generalized rater bias (perceiver variance) and of assumed similarity. Additionally, intraclass correlations suggested a 'group personality' for some traits. The findings suggest that the use of personality questionnaires in Social Relations Analyses may promote higher estimates of consensus in personality judgments. Copyright © 2010 John Wiley & Sons, Ltd.

Key words: HEXACO; SRM; consensus; self-other agreement; assumed similarity; projection; reciprocity; group personality

INTRODUCTION

The Social Relations Model (SRM) (Kenny, 1994; Kenny & La Voie, 1984) has had a strong impact on the debate about the nature and content of person perception. Social Relations Analysis makes it possible to separate person perception into target, perceiver, relationship and error variance. Target variance reflects the consensus among a group of people when rating a target. Perceiver variance reflects the common component in a person's ratings of others—that is, somebody's generalized rater bias. Relationship variance reflects the unique, idiosyncratic, component in a person's perception of the individual group members—that is, somebody's idiosyncratic rater bias. Although the SRM has been applied to a large range of topics (Kenny, 1994), it is of special interest for the assessment of personality, because it provides an indication to researchers about the

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extent to which observers' personality judgments of a target are trait-based, perception-based and/or relationship-based.

Personality studies using Social Relations Analysis (e.g. Branje, Van Aken, Van Lieshout, & Mathijssen, 2003; Kenny, 1994; Kenny, Albright, Malloy, & Kashy, 1994; Malloy, Albright, Kenny, Agatstein, & Winquist, 1997; Park, Kraus, & Ryan, 1997; Paulhus & Reynolds, 1995) have revealed only modest amounts of target variance in so-called round-robin designs, in which all of the judges in a group of at least four persons rate each others' personality. However, all of these studies employed a rather restricted set of adjectives to measure personality, which may have attenuated the amount of target variance in the analyses. Secondly, new developments in the personality structure debate, notably the advent of the HEXACO model (Ashton et al., 2004; Lee & Ashton, 2004), have made a fresh look at personality perception desirable. And thirdly, personality assessment has become increasingly important in the work context. In particular, the question of construct validity of Honesty–Humility is of paramount importance for its use—or the use of similar constructs—in selection and assessment procedures. This study uses the SRM to investigate the amount of target, perceiver and relationship variance using the HEXACO Personality Inventory. In this study I will investigate and compare using the HEXACO factor scales (1) the three variance components in family and work groups and (2) the amount of self-other agreement, assumed similarity, projection and reciprocity of HEXACO personality ratings.

The Social Relations Model

The principal design in the study of personality using the SRM is the round-robin design (Table 1). In a round-robin design, all persons in a group rate all other persons. Self-ratings—the bold ratings on the diagonal in Table 1—may be included or excluded in such a design, but because self-ratings are assumed to be based on psychological processes that are qualitatively different from those on which observer ratings are based, they are omitted in the analysis of variance, creating an unbalanced design. Additionally, in social relations, there are several processes that may cause a violation of the assumption of non-independence in ANOVA, such as projection and reciprocity. For instance, an agreeable person (target characteristic) may be more likely to rate other people as agreeable

Table 1. Example of the lay-out of round-robin data in the Social Relations Model

Target	Perceiver				Target means
	1	2	3	4	
1	x_{111}	x_{121}	x_{131}	x_{141}	t_1
	x_{112}	x_{122}	x_{132}	x_{142}	
2	x_{211}	x_{221}	x_{231}	x_{241}	t_2
	x_{212}	x_{222}	x_{232}	x_{242}	
3	x_{311}	x_{321}	x_{331}	x_{341}	t_3
	x_{312}	x_{322}	x_{332}	x_{342}	
4	x_{411}	x_{421}	x_{431}	x_{441}	t_4
	x_{412}	x_{422}	x_{432}	x_{442}	
Perceiver means	p_1	p_2	p_3	p_4	m

Note: The bold ratings on the diagonal are self-ratings, which are not included in the target, perceiver and overall means. To estimate relationship variance, it is necessary to have at least two measurements of each construct (i.e. x_{ij1} and x_{ij2}). For a full mathematical description, see Kenny (1994).

(perceiver characteristic), bringing about positive associations between target and perceiver effects (projection). Similarly, a person who is especially agreeable to one particular person in a group may instigate agreeable behaviour in return from this person (reciprocity). Both of these effects necessitate an analysis different from that which is possible using standard ANOVA.

The solution for these problems in a round-robin design is offered by the SRM (Kenny, 1994; Kenny & La Voie, 1984; Warner, Kenny, & Stoto, 1979), which takes into account missing self-ratings and violations of the independence assumption. To be able to separate different sources of variance, a round-robin design has to consist of groups with at least four persons and at least two measurements of a construct (see Table 1). First of all, the SRM partitions ratings into a stable and an unstable part, according to the following formula:

$$x_{ijk} = s_{ij} + u_{ijk} \quad (1)$$

where x_{ijk} is the rating of person i by perceiver j on measure k of a construct, s_{ij} is the 'stable' part of the rating of person i by perceiver j , and u_{ijk} is the 'unstable' part of the rating of person i by perceiver j on measure k . To give an example, in Table 1 the rating of target $t=1$ by perceiver $p=3$ on the first measure of a construct $k=1$ is equal to $x_{131} = s_{13} + u_{131}$ and the rating of target $t=1$ by perceiver $p=3$ on the second measure of a construct $k=2$ is equal to $x_{132} = s_{13} + u_{132}$.

The stable part of formula (1) consists of the overall mean and the mean (i.e. across measures) of the target ratings, perceiver ratings and relationship ratings:

$$s_{ij} = m + t_i + p_j + r_{ij} \quad (2)$$

where m is the group mean, t_i is the mean target rating of person i , p_j is the mean perceiver rating of person j and r_{ij} is the idiosyncratic relationship rating of dyad ij . Formula (2) is the main part of the SRM and it is to the elements of this formula that scholars refer to when reporting results from Social Relations Analyses. In the remainder of the paper, whenever I refer to target, perceiver and relationship variance, I will refer to the elements of formula (2).

For the sake of completeness, the unstable part consists of the deviation of the overall mean, the target ratings and the perceiver ratings due to the use of multiple measures. The unstable part is reflected in the following formula:

$$u_{ijk} = m_k + t_{ik} + p_{jk} + r_{ijk} \quad (3)$$

where m_k is the deviation from the grand mean for each of the different measures of a construct and t_{ik} , p_{jk} and r_{ijk} are respectively the deviations from the target means, perceiver means and relationship means for the different measures of a construct. The unstable relationship part, r_{ijk} , is commonly referred to as the overall error component. Usually, provided that observers are consistent in the ratings of another person, the unstable target and perceiver variances (t_{ik} and p_{jk}) are negligible, but it is generally less often true that the means of different measures of a same construct (m_k) are equal. That is, different measures of a construct (e.g. items) may have different means, depending on whether people on average are more or less likely to exhibit the behaviour targeted in the measures. Although useful in order to understand SRM, in the remainder of the paper I will not distinguish between the different elements of formula (3).

The SRM allows for a test of several fundamental personality hypotheses. In the first place, it allows for a test of the relative amounts of target, perceiver and relationship variance. That is, it allows for a test of the assumption that personality ratings are due to real or consensually agreed upon personality characteristics, to generalized rater biases such as leniency, and/or to idiosyncratic rater biases based on the unique dyadic relationships between targets and perceivers. Secondly, if self-ratings are included, it allows for a test of the level of self-other agreement and assumed similarity. Self-other agreement pertains to the extent to which other people agree with self-ratings of personality. In the SRM, it is operationalized through the correlation between the self-ratings (x_{ijk} for all cases in which $i = j$) and the mean target ratings (t_i). Assumed similarity pertains to the extent to which people tend to perceive others similar to the self. It is operationalized through the correlation between the self-ratings and the mean perceiver ratings (p_j). Thirdly, the inclusion of relationship variance in the SRM allows for a test of projection and reciprocity effects. Personality projection is the ascription of a target's personality—as perceived by others—to other people in general and is operationalized in the SRM through the correlation between the target ratings (t_i) and the perceiver ratings (p_j). Reciprocity of personality ratings is the dyadic version of projection and is operationalized through the correlation of dyad members' relationship ratings (i.e. the correlation between r_{ij} and r_{ji} , with $i \neq j$).

Personality perception in the Social Relations Model

The first studies on the extent of target, perceiver and relationship variance have revealed only modest target variance in personality ratings. Based on a review of 10 studies, Kenny (1994) suggested a 15-20-20 'rule' for the amount of target, perceiver and relationship variance. That is, in these studies on average approximately 15% of the variance in personality ratings was due to consensus about the personality of a target person, 20% to generalized rater bias, 20% to idiosyncratic rater bias and 45% to unstable (or, error) variance. Even after correction for attenuation, target variance would be well below one-third of the variance, suggesting that personality judgment may indeed more aptly be named personality perception because of the strong rater bias components in other ratings of personality traits.

The 15-20-20 rule has been contested, however, and some studies have come up with higher levels of target variance. Using third-year students' groups who discussed a range of topics for 7 weeks, Paulhus and Reynolds (1995) found that target variance rose from 20% in the first week to 28% in the seventh week. Additionally, target variance in their study was substantially higher than perceiver variance. Using dormitory students who completed round-robin personality ratings in four waves, Park, Kraus, and Ryan (1997) found that the ratings contained, across waves, an average of 23% target variance, 9% perceiver variance and 34% relationship variance. However, in a large-scale family study, which consisted of groups of two parents and two adolescents, Branje, Aken, Lieshout, and Mathijssen (2003) came up with levels of target, perceiver and relationship variance that closely matched those of Kenny (1994).

There are three possible reasons for the relatively low levels of consensus (target variance) in personality ratings in these studies: (1) relational characteristics, (2) trait characteristics and (3) instrument characteristics. Of these three, the first two have been extensively studied, but the latter may not have been addressed properly. With respect to relational characteristics, high levels of acquaintanceship have been found to yield higher

mean levels of consensus than lower levels of acquaintanceship (Biesanz, West, & Millevoi, 2007; Watson, Hubbard, & Wiese, 2000). In a review of a number of studies, Kenny et al. (1994) found that consensus rose from a mean target variance of 12% at zero acquaintanceship to 27% at long-term acquaintanceship. Similary, Malloy et al. (1997) found consensus estimates of 34, 32 and 30% for co-workers, friends and family, respectively. These numbers seem to fairly closely match the level of consensus Paulhus and Reynolds (1995) found after seven weeks in their discussion groups.

With respect to trait characteristics, different traits have been found to yield consistent differences in levels of consensus. Especially extraversion has been found to yield higher levels of consensus at low levels of acquaintance than others traits (Kenny, 1994; Kenny et al., 1994; Paulhus & Reynolds, 1995). According to Funder (1995) and Watson et al. (2000), higher levels of consensus may be due to the visibility of a trait. For example, extraverted behaviours are highly notable at first encounters, in contrast to behaviours associated with (for instance) Openness to Experience and Conscientiousness. Research shows that the level of consensus for traits tends to increase with acquaintanceship, but that this is less true for Extraversion because of the relatively high levels of consensus of Extraversion at zero acquaintanceship (Kenny et al., 1994; Paulhus & Reynolds, 1995).

With respect to instrument characteristics, there has been a surprising lack of studies on the SRM that have used questionnaire items instead of adjectives. For instance, Park et al. (1997) used 10 bipolar adjectives rated on a 7-point scale to measure all Big Five traits. Branje et al. (2003) used a total of 30 unipolar adjectives, six adjectives per personality trait, to measure the Big Five factors. And although Paulhus and Reynolds (1995) tried to enhance consensus by disallowing ties in ratings of individual in a group, they had participants rate only 15 bipolar adjectives for each person in the group; that is, three bipolar adjectives per Big Five factor.

Although the use of a limited number of (short) adjectives to measure personality traits may minimize the burden on participants, this practice may also result in two unwanted side effects. In the first place, broad personality traits are hard to measure reliably with a short measurement instrument. The resulting scale score either contains a high level of error or reflects a very narrow personality domain. In the second place, adjectives are more likely than well-constructed item sentences to yield evaluative ratings. Questionnaire items can be constructed in such a way that the items are grounded in typical behavioural tendencies, whereas adjectives more often than not refer to more abstract personality properties, which are more prone to perceiver biases—and thus higher perceiver variance. Consequently, as a result of these side effects, the use of a full-length personality questionnaire instead of a short list of adjectives may result in higher levels of consensus due to the ability of a personality questionnaire to generate higher levels of broad trait-level reliability and validity (see Paulhus & Reynolds, 1995, p. 1240, for a similar line of reasoning) and lower levels of perceiver variance.

The HEXACO model of personality

Apart from the possibility that the use of a personality questionnaire may yield higher levels of consensus than the use of trait adjectives, there is another reason for a renewed look at the level of target, perceiver and relationship variance in personality ratings. All of the round-robin personality studies so far have concentrated on Big Five factors. Recent studies, however, have suggested that instead of five there are actually six main factors of personality (Ashton et al., 2004; Lee & Ashton, 2008). These six factors are collectively

known as the HEXACO factors for Honesty–Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness and Openness to Experience. Although there are several differences in the HEXACO model as compared with the Big Five model (see Ashton & Lee, 2007), one of the main differences is the addition of the Honesty–Humility factor in the HEXACO model. People with a high level of Honesty–Humility are sincere, fair, modest and greed avoidant and are, in general, unwilling to exploit other people for personal gain. The HEXACO model and its operationalization through the HEXACO Personality Inventory-Revised (HEXACO-PI-R; Ashton & Lee, 2008), has been able to explain variance in important behaviours and criteria, such as psychopathy, Machiavellianism, narcissism, workplace delinquency, egoism, unethical decision-making, materialism and seductiveness (Ashton & Lee, 2008; De Vries, De Vries, De Hoogh, & Feij, 2009; De Vries, Lee, & Ashton, 2008; Lee & Ashton, 2005; Lee, Ashton, & De Vries, 2005) that is not explained by the Big Five personality traits. This predictive advantage has been accomplished mainly through the inclusion of Honesty–Humility in the HEXACO model.

However, Honesty–Humility, and related Integrity measures (Lee et al., 2005), may be harder to judge than other personality traits.¹ One of the defining characteristics of Integrity-like measures is that the behaviours that they purport to measure are ones that people will be less likely to reveal, or even will try to disavow in order to be better able to exploit others. Additionally, these behaviours are probably more likely to be exhibited in situations in which there is a weak situational control instead of in situations in which repercussions may result. Consequently, in contrast with the judgment of other traits, people may be more likely to resort to self-based heuristics (Ready, Clark, Watson, & Westerhouse, 2000) or stereotyping when estimating other people's Honesty–Humility. This may result in a lowering of the target variance and an elevation of the perceiver variance. Compared to other personality traits, Honesty–Humility may generate relatively lower levels of target variance and higher levels of perceiver variance. Consequently, the first hypothesis of this study is as follows:

Hypothesis 1: *Compared with other HEXACO personality variables, the amount of target variance in Honesty–Humility is lower and the amount of perceiver variance is higher.*

Self-other agreement and assumed similarity

Although some studies have revealed high levels of perceiver and relationship variance and only low to modest levels of target variance (Branje et al., 2003; Kenny, 1994), these and other studies have consistently revealed high levels of self-other agreement, averaging for instance .55 in Branje et al.'s (2003) study, .48 in Kenny's (1994) studies, and .43 in the second wave of Paulhus and Reynolds (1995) study. Self-other agreement using the HEXACO Personality Inventory in family and partner dyads has been notably high, averaging .62 for family members and .69 for partners in De Vries et al.'s (2008) study. Self-other agreement correlations for Honesty–Humility were .49 among family members and .60 among partners. Apart from the Honesty–Humility facet of Sincerity, the findings of Lee, Ashton, Pozzebon, Visser, Bourdage, and Ogunfowora (2009) showed levels of self-other agreement for the Honesty–Humility facets close to those of the other HEXACO

¹Some facets of Honesty–Humility have been shown to have higher levels of self-other agreement than others. In Lee et al.'s (2009) first two studies, the Honesty–Humility facets Fairness and Greed Avoidance showed substantially higher levels of self-other agreement than the facet Sincerity, presumably because insincere behaviours, such as subtle forms of manipulations, are less easy to observe than unfair and greedy behaviours.

facet scales, and Honesty–Humility showed a level of self-other agreement (i.e. .52) almost as high as the levels shown by the other HEXACO factor scales (i.e. on average .55).

One of the main worries about the interpretation of self-other agreement has been that self-other convergent correlations may result from a combination of real similarity and assumed similarity. That is, if people are really similar, high levels of assumed similarity will result in high levels of self-other agreement. Research has shown that these worries are unfounded, because typically, in dyads, people's personalities are unrelated or related modestly at best (Funder, Kolar, & Blackman, 1995). However, assumed similarity has been found to be a real phenomenon, averaging .34 in Kenny's (1994) studies and a high of .63 in Branje et al.'s (2003) study. In Lee et al.'s (2009) dyadic study, the assumed similarity correlations were found to be especially high for Honesty–Humility and Openness to Experience (respectively .46 and .30), averaging only .08 for the other factor scales. Lee et al. (2009) explained the difference between Honesty–Humility and Openness to Experience on the one hand and the other trait scales on the other by the strong correspondence of Honesty–Humility and Openness to Experience to the domain of human values and by noting that in close relationships, people tend to assume that the other has values similar to theirs. Consequently, in line with previous studies, I generally expect high (significant) levels of self-other agreement for all HEXACO scales and, in line with Lee et al. (2009), elevated levels of assumed similarity for Honesty–Humility and Openness to Experience, but not for the other HEXACO factor scales.

Hypothesis 2: All of the HEXACO factor scales are characterized by high levels of self-other agreement.

Hypothesis 3: Compared to the other HEXACO scales, Honesty–Humility and Openness to Experience are characterized by relatively high levels of assumed similarity.

Projection and reciprocity

There is a logical connection between self-other agreement, assumed similarity, and projection. To the extent that people agree with others about their own personality (as indicated by self-target correlations), and to the extent that they assume others are similar to them (as indicated by self-perceiver correlations), they are more likely to project their personality—as consensually perceived by others—on others (as indicated by target-perceiver correlations).² On the whole, there is only partial evidence for projection of personality traits. Both Kenny (1994) and Paulhus and Reynolds (1995) found some evidence for projection of Agreeableness, but not on other Big Five traits. People who are perceived by others to be more agreeable seem to be more likely to perceive others in general as agreeable as well. However, Lee et al. (2009) only found marginal levels of assumed similarity for the HEXACO variant of Agreeableness, making it unlikely that HEXACO Agreeableness, which is a rotated version of Big Five Agreeableness and Emotional Stability, is a candidate for projection. However, some of the variance of Big Five/FFM Agreeableness is taken up by Honesty–Humility (Ashton & Lee, 2005), and given the fact that both self-other agreement and assumed similarity have been found to be

²Kenny (1994) uses the term generalized reciprocity for projection, because target-perceiver correlations do not necessarily entail that people are unaware of the personality traits they project. In accordance with Paulhus and Reynolds (1995), I subscribe to the more general meaning of the term projection to denote the process whereby a person perceives others to be characterized by a certain trait, which others consensually agree this person has him-/herself.

high for Honesty–Humility (Lee et al., 2009), Honesty–Humility may instead be the most likely candidate for a projection effect. That is, people who are fair and sincere to others—and thus are judged to be fair and sincere by others—may show this kind of behaviour in part because they trust (and therefore perceive) others to be fair and sincere in return.

The above reasoning applies to Openness to Experience as well, because Openness to Experience has been found to generate both high levels of self-other agreement and high levels of assumed similarity (Lee et al., 2009). That is, by virtue of a high level of self-other agreement and high level of assumed similarity, a projection effect is likely. However, in Social Relations Analyses, there has been not much evidence for a projection effect of Big Five Openness to Experience (Kenny, 1994; Paulhus & Reynolds, 1995). There are two possible explanations of these different findings: (1) the lack of findings in SRM studies may be due to an artefact of the use of personality adjectives instead of a personality questionnaire, and (2) it may be due to the nature of the samples used in the different studies. In Lee et al.'s (2009) study, participants consisted of well-acquainted friendship dyads, while in Paulhus and Reynolds' (1995) study the participants were unacquainted students participating in the same course. Interestingly, in Watson et al.'s (2000) study, the highest level of assumed similarity for Openness to Experience was found for dating couples ($r = .50$), whereas a much lower level of assumed similarity was found for married couples ($r = .18$), suggesting that a projection effect is more likely in dating couples than in married couples. Note that in this study, except for Openness to Experience, assumed similarity correlations were generally similar across samples. Thus, it may be true that assumed similarity for Openness to Experience differs depending on the type of relationship, with lowest levels of assumed similarity and projection for unacquainted dyads ('strangers') and intimate dyads ('partners'), and high levels of assumed similarity and projection for people who are romantically involved.³ I will use this study to explore whether projection occurs for Openness to Experience. However, I do propose a projection effect for Honesty–Humility using the following hypothesis:

Hypothesis 4: *There is a positive relation between the target and perceiver ratings of Honesty–Humility, indicating a projection effect.*

Reciprocity, the association in a group between the unique component in ratings given by person A to person B on the one hand and the unique component in ratings given by person B to A on the other hand, is the dyadic version of projection. To give an example, there is reciprocity in Agreeableness when a person A, who is especially agreeable to person B, provokes especially agreeable behaviour from person B in return. Interestingly, although trait ratings seem to consist of a considerable amount of unique relationship variance (Branje et al., 2003; Kenny, 1994; Park et al., 1997; Paulhus & Reynolds, 1995), there is even less evidence for reciprocity than there is for projection. In both Kenny's (1994) overview and Paulhus and Reynolds' (1995) study, no evidence was found for reciprocity in trait ratings, not even for Agreeableness. This is contrasted by strong reciprocity effects for variables such as liking (Kenny, 1994). Consequently, the unique

³Note that Watson et al. (2000) also investigated the assumed similarity of friendship dyads, which, from the description of the sample characteristics, appear to be highly similar to the friendship dyads employed in Lee et al.'s (2009) sample. Watson et al. (2000) found an assumed similarity correlation of .23, which was slightly lower than the assumed similarity correlation of .35 in Lee et al.'s (2009) study. Both are higher than the assumed similarity in married couples and lower than the assumed similarity in dating couples in Watson et al.'s (2000) study.

component in trait ratings does not seem to be caused by reciprocity of behaviours, and thus I expect no reciprocity effects for any of the HEXACO personality variables.

Summary and setting

To summarize, this study will investigate the extent of target, perceiver and relationship variance in the HEXACO model of personality and the level of self-other agreement, assumed similarity, projection and reciprocity in the HEXACO variables. To be able to generalize the findings, this study is conducted in two different settings: a family setting and a work setting. Self-other agreement on personality has been found to be lower in work settings than in family settings (De Vries et al., 2008), and thus this study will examine the nature of the differences in personality judgments in these two settings.

METHOD

Sample and procedure

Through a snowball procedure, family groups and work groups were contacted to participate in this study in return for a free personality profile. To participate, a family group had to consist of four directly related family members (e.g. two parents and two adult children, or three adult children and one parent) and a work group had to consist of four people who worked closely together (e.g. three co-workers and a supervisor, or four co-workers). In total 206 (58% women) people participated in the study, of whom 111 (57% women) in the family context and 95 (59% women) in the work context. The mean age was 36.4 ($SD = 14.0$); 37.4 ($SD = 16.8$) in the family setting and 35.3 ($SD = 9.8$) in the work setting.

Participants obtained an internet link through which they were able to access the questionnaire. First of all, they completed the self-ratings and subsequently they completed the other-ratings of the three (family or work) group members. Because the participants could choose who they rated first, second and third of the group members, the order of the group members' ratings varied from group member to group member. Not all groups were complete and not all group members provided all ratings. Deleting these cases resulted in 172 usable questionnaires comprising 43 four-person groups (24 family groups and 19 work groups), which is a fairly typical sample size for this kind of study (see Kenny, 1994; Appendix A; Malloy et al., 1997; Paulhus & Reynolds, 1995). In these 43 groups, there were four cases in which there were some missing data at the end of the questionnaire. In order to retain as many groups as possible, mean substitution was used to fill in these missing blanks.

Instruments

HEXACO-PI-R

The HEXACO-PI-R used in this study is the half-length version, which consists of 100 items. Four of these items measure the interstitial scale of Altruism (versus Antagonism) and were removed from this study, thus leaving 96 'factor-pure' items to be used. Each of the six HEXACO factor-level scales contains four facets, each of which consists of four items, and thus each of the HEXACO factor scales was measured by 16 items. All items

were answered using a 1–5 (strongly disagree–strongly agree) answering scale. In the other-ratings of the HEXACO items, the observer-report form of the HEXACO-PI-R was used. In previous studies, the factor scales were characterized by high levels of reliability and low levels of factor scale intercorrelations (Ashton & Lee, 2008; De Vries, Ashton & Lee, 2009). In this study, the α -reliabilities ranged from .75 to .83 for the self-ratings and from .81 to .87 for the other-ratings. All factor scale intercorrelations were below $|r| = .30$, with the exception of the correlation between Honesty–Humility and Conscientiousness in the other ratings (.39) and the correlation between Emotionality and Agreeableness (−.31) in the self-ratings. Matched pairwise comparison of aggregated other-ratings and self-ratings showed a few small (in terms of Cohen's (1992) d) significant self-enhancement effects, with slightly higher self- than other-ratings on Honesty–Humility, Conscientiousness and Openness to Experience (see Table 2).

Analyses

Data were organized according to a 4×4 round-robin design (see Table 1), with each of the raters providing self-ratings and three other-ratings. The data were analysed using the SOREMO program (Kenny, 1998). Using the formulas described in Kenny (1994), the program allows users to separate the amounts of stable and unstable variance, and to estimate the relative amounts of stable target, perceiver, and relationship variance. Additionally, it allows users to calculate self-other agreement (self-target correlations), assumed similarity (self-perceiver correlations), projection (target-perceiver correlations) and reciprocity (interpersonal relationship correlations). To be able to estimate the amount of relationship variance, there have to be at least two (manifest) measurements for each of

Table 2. Correlations, α -reliabilities and descriptives of the HEXACO variables among self-ratings ($N=206$; below diagonal) and other-ratings ($N=595$, above diagonal)

	H	E	X	A	C	O
Honesty–Humility		.05	−.03	.29**	.39**	.25**
Emotionality	.09		−.05	−.22**	−.01	.02
eXtraversion	−.10	−.06		.11**	.04	.13**
Agreeableness	.17*	−.31**	.11		.11**	.22**
Conscientiousness	.17*	−.02	.23**	.07		.14**
Openness to Experience	.10	−.01	.15*	−.03	−.02	
Self-ratings						
α	.81	.82	.77	.75	.76	.83
m	3.58	3.08	3.61	2.95	3.57	3.20
SD	.55	.55	.45	.45	.46	.62
Other-ratings						
α	.86	.84	.81	.87	.84	.81
m	3.47	3.12	3.54	2.94	3.44	2.98
SD	.59	.54	.46	.57	.55	.55
Self-other difference						
d	.20*	−.07	.14	−.03	.27**	.38**

Note: The test of self-other difference was based on 172 self-ratings which were paired with 172 matched 3-person mean other-ratings. The means and standard deviations were from the original sample ($N=206$ self-ratings and $N=595$ other-ratings).

* $p < .05$; ** $p < .01$.

the (latent) constructs. Because the program allows for a maximum of 20 manifest variables, it was impossible to use all HEXACO facets, and thus I decided to split each of the six HEXACO factor scales in two facets using the distributed uniqueness strategy (Hagtvet & Nasser, 2004). For instance, Honesty–Humility originally contains four facets, Sincerity, Fairness, Greed Avoidance and Modesty. One of the two Honesty–Humility facets used in the SOREMO analysis contained two items from Sincerity, two from Fairness, two from Greed Avoidance and two from Modesty, and the other facet contained the other two items from these original facets. Care was taken, as much as possible, to have one recoded and one non-recoded item from the original facets in each of the two new facet scales. The correlations between the two new facets (and the α -reliabilities) were as follows: Honesty–Humility, .83 (.90); Emotionality, .76 (.86); Extraversion, .76 (.86); Agreeableness, .81 (.89); Conscientiousness, .79 (.88); and Openness to Experience, .72 (.84).⁴

When more than one manifest variable is used for a construct, the SOREMO output does not provide significance levels, and these have to be computed manually from the variances and covariances of the groups provided by the program. Although the exact distributional properties of these (co-)variances are unknown, Kenny (1994) recommends testing the estimates against the expectation that they are zero using standard *t*-tests. Apart from Table 2, all tables in the Results section contain these manually computed significance levels.

The SOREMO program controls for between-group differences when calculating the amounts of stable target, perceiver and relationship variance by pooling these variance estimates across groups. Because the SOREMO program does not take into account the amount of group variance in self- and other reports, I checked for the presence of between-group variance by calculating the intraclass correlation coefficients ICC(1) and ICC(2) (Shrout & Fleiss, 1979) in the family ($N = 23$ groups), work ($N = 19$ groups) and combined samples ($N = 43$ groups) in both self- and aggregated other-ratings (Table 3). The results show some notable between-group effects in most of the HEXACO factor scales. Most notable is the strong presence of between-group variance in Honesty–Humility in both self- and other-aggregated ratings in family groups. In contrast, in both self- and other-aggregated ratings in family groups, negligible levels of between-group variance (i.e. ICC(1) values $< .10$) were found for Emotionality and Agreeableness. In both self- and other-aggregated ratings in work groups, there was a consistent and relatively strong between-group effect in Conscientiousness, but except for self-ratings of Honesty–Humility, all of the self- and other-aggregated personality ratings also contained non-negligible between-group variance. Consequently, the results point to some level of positive assortment of personality in both the family groups and the work groups. Although the way results are reported in this study is in line with the way results are reported in other studies using Social Relations Analyses (Kenny, 1994; Kenny et al., 1994; Malloy et al., 1997; Park et al., 1997; Paulhus & Reynolds, 1995), it should be noted that the results do not take into account the relatively high level of between-group variance present in some of the HEXACO factor scales, that is, stable target, perceiver and relationship variance are calculated based on within-group variance only.

⁴Note that these reliabilities are slightly different than those reported in the Instruments section, partly because they are based on somewhat different samples, i.e., in the latter analysis the final sample of 172 was used instead of the start-up sample of 206.

Table 3. Intraclass correlation coefficients in self-ratings and other-aggregated ratings of the HEXACO factor scales

	Self-ratings						Other-aggregated ratings				
	Family		Work		All		Family		Work		All
	ICC(1)	ICC(2)	ICC(1)	ICC(2)	ICC(1)	ICC(2)	ICC(1)	ICC(2)	ICC(1)	ICC(2)	ICC(1)
Honesty-Humility	.31	.65	−.04	−.20	.14	.40	.59	.85	.26	.58	.50
Emotionality	.03	.12	.18	.47	.07	.24	−.05	−.25	.11	.33	−.01
Extraversion	.23	.55	.25	.58	.24	.56	.10	.31	.18	.47	.13
Agreeableness	.03	.12	.15	.41	.09	.27	.00	.00	.24	.56	.13
Conscientiousness	.25	.58	.23	.55	.25	.57	.07	.24	.27	.60	.14
Openness to Experience	.19	.49	.14	.39	.17	.46	.17	.45	.12	.35	.16
Mean	.17	.42	.15	.37	.16	.42	.15	.27	.20	.48	.18
											.39

Note: Family N's: (N = 24), Work (N = 19) and All (N = 43); Classic N's: Family (N = 96), Work (N = 76), and All (N = 172).

RESULTS

As explained above, I used regular length questionnaire scales in the Social Relations Analysis, not short adjective scales of the kind used in previous studies. First of all, I was interested in the overall amount of target, perceiver and relationship variance in the HEXACO scales and in comparing these results with those of earlier research. The results of the analyses in the family, work and combined family and work settings are reported in Table 4. The results offer a marked contrast with the 15-20-20 target, perceiver and relationship variance rule suggested by Kenny (1994), suggesting a '35-15-25' rule instead. That is, in this study the overall the amount of target variance was more than twice as high as in Kenny's (1994) study. After correction for attenuation (i.e. removal of unstable variance), the target variance approached 50% in the combined sample.

When comparing the family and work setting, most notable was the higher level of target variance in the family setting. Perceiver variance, relationship variance and unstable variance were all somewhat higher in the work setting. In the combined sample, for all of the HEXACO variables, there was a significant amount of target and relationship variance. This was not the case for perceiver variance; for Emotionality, Extraversion and Conscientiousness the amount of perceiver variance was not significantly different from zero. When comparing the different sources of variance in the HEXACO factor scales, the most striking difference between Honesty–Humility and the other HEXACO factor scales was the presence of a significant amount of group variance (as reported in the Method section and Table 3) in Honesty–Humility, combined with lower levels of target variance and higher levels of perceiver variance in this scale as compared with the rest of the HEXACO factor scales. This was contrasted with relatively high levels of target variance and low levels of perceiver variance in Emotionality, Extraversion and Conscientiousness. Hypothesis 1—which stated that Honesty–Humility would have lower levels of target variance and higher levels of perceiver variance than other traits, was tested using pairwise comparisons in the complete (family plus work) sample. In line with Hypothesis 1, Honesty–Humility had significantly lower target variance ($t(df=42)=2.85, p < .01$) than Emotionality. However, the amount of target variance in Honesty–Humility was not significantly different from that of any other HEXACO factor scale. The amount of perceiver variance in Honesty–Humility was significantly higher than it was in Emotionality ($t(df=42)=5.91, p < .01$) and in Extraversion ($t(df=42)=5.81, p < .01$). However, there were no significant differences in the amounts of perceiver variance between Honesty–Humility and HEXACO Agreeableness, Conscientiousness and Openness to Experience.

In Table 5 the self-other agreement results in the family, work and combined settings are shown. To compare the SRM self-other agreement values with standard self-other agreement values, I also computed the amount of self-other agreement using the self-ratings and the aggregated other ratings. These are denoted as 'classic' self-other agreement values in Table 5. The difference between the SRM self-other agreement and the classic self-other agreement is that in the former, the self-ratings are correlated with the mean target ratings t_i within each group and then pooled across groups, i.e. it is the correlation of the self-ratings with target ratings after partialling out group variance. The classic self-other agreement is the straightforward correlation of the self-ratings with the aggregated other-ratings.

The results in Table 5 for the SRM self-other agreement and the classic self-other agreement are highly similar, with slightly higher average levels of self-other agreement

Table 4. Relative variance of constructs using Social Relations Analysis of Family ($N=24$), Work ($N=19$) and All ($N=43$); the numbers between brackets are corrected for unstable variance

	H	E	X	A	C	O	Mean
Family							
Target	.22** (.27)	.55** (.69)	.45** (.58)	.39** (.48)	.42** (.54)	.39** (.50)	.40 (.51)
Perceiver	.35** (.44)	.03 (.04)	.05 (.07)	.10* (.12)	.08 (.10)	.18** (.22)	.13 (.17)
Relationship	.23* (.29)	.21* (.27)	.27* (.35)	.33** (.40)	.28** (.36)	.22** (.28)	.26 (.32)
Unstable variance	.20	.20	.23	.18	.22	.22	.21
Work							
Target	.24** (.29)	.34** (.52)	.37* (.53)	.21 (.25)	.30** (.41)	.18* (.28)	.27 (.38)
Perceiver	.38** (.46)	.06 (.09)	.04 (.06)	.11 (.14)	.04 (.05)	.25* (.39)	.15 (.20)
Relationship	.20** (.25)	.25** (.39)	.29** (.41)	.50* (.61)	.39** (.54)	.22* (.34)	.31 (.42)
Unstable variance	.18	.35	.30	.19	.28	.36	.27
All							
Target	.23** (.28)	.49** (.65)	.42** (.56)	.33** (.41)	.38** (.50)	.33** (.44)	.36 (.47)
Perceiver	.36** (.45)	.04 (.05)	.05 (.07)	.10* (.12)	.07 (.09)	.20** (.27)	.14 (.17)
Relationship	.22** (.27)	.22* (.30)	.28** (.37)	.38** (.47)	.31** (.41)	.22** (.29)	.27 (.35)
Unstable variance	.19	.24	.25	.19	.24	.26	.23

* $p < .05$; ** $p < .01$.

Table 5. SRM self-other agreement (self-target correlations) and 'classic' self-other agreement (correlation target self-ratings with the average target-ratings by others)

	Self-other agreement					
	SRM			Classic		
	Family	Work	All	Family	Work	All
Honesty-Humility	.62**	.41	.51**	.60**	.33**	.48**
Emotionality	.61**	.60**	.60**	.60**	.55**	.57**
eXtraversion	.55**	.37	.48**	.59**	.40**	.52**
Agreeableness	.58**	.50**	.53**	.46**	.33**	.40**
Conscientiousness	.53**	.39	.48**	.52**	.50**	.51**
Openness to Experience	.60**	.78**	.63**	.61**	.51**	.58**
Mean	.58	.51	.54	.56	.44	.51

Note: SRM N's: Family ($N=24$), Work ($N=19$) and All ($N=43$); Classic N's: Family ($N=96$), Work ($N=76$) and All ($N=172$).

* $p < .05$; ** $p < .01$.

for the SRM analyses. On average the level of self-other agreement was high in both the family and work setting. In the SRM analyses, the average self-other agreement of the HEXACO variables was .58 in the family sample, .51 in the work sample and .54 in the combined sample. In the combined sample, all of the SRM self-other agreements were significantly different from zero, confirming hypothesis 2.

In Table 6, the assumed similarity results for the HEXACO variables in the family, work and combined settings are shown. Again, both the SRM and classic assumed similarity correlations are shown. The SRM assumed similarity correlations are the correlations of the self-ratings with the mean perceiver ratings p_j partialling out group variance. The classic assumed similarity correlations are the correlations of the self-ratings with the aggregated other-ratings of the same persons who provided self-ratings. Again, SRM assumed similarity correlations were comparable to, albeit on average slightly lower than,

Table 6. SRM assumed similarity (self-perceiver correlations) and 'classic' assumed similarity (correlations of target self-ratings with the average perception by target of others)

	Assumed similarity					
	SRM			Classic		
	Family	Work	All	Family	Work	All
Honesty-Humility	.62**	.42**	.51**	.63**	.38**	.53**
Emotionality	-.30	.20	-.13	-.05	.19	.02
eXtraversion	.34	.44	.37*	.36**	.31**	.34**
Agreeableness	.59**	-.11	.29	.26*	-.00	.14
Conscientiousness	.12	-.15	.05	.22*	.27*	.24**
Openness to Experience	.25	.39*	.30*	.34**	.27*	.32**
Mean	.27	.20	.23	.29	.24	.27

Note: SRM N's: Family ($N=24$), Work ($N=19$) and All ($N=43$); Classic N's: Family ($N=96$), Work ($N=76$) and All ($N=172$).

* $p < .05$; ** $p < .01$.

the classic assumed similarity correlations. The average level of assumed similarity was much lower than the average level of self-other agreement, i.e. for the SRM analyses on average .27 in the family sample, .20 in the work sample and .23 in the combined sample. In the combined sample, the assumed similarity of both Honesty–Humility and Openness to Experience were significantly different from zero, confirming hypothesis 3. Note that the assumed similarity of Extraversion was also significantly different from zero, but this was not the case for Emotionality, Agreeableness and Conscientiousness. However, in contrast with Honesty–Humility and Openness to Experience, the level of perceiver variance in Extraversion was particularly low. Because the self-perceiver correlation pertains to the correlation between the self-ratings and the perceiver ratings of Extraversion, the latter of which had a low (and not significantly different from zero) amount of variance (see Table 4), this correlation is not particularly meaningful.⁵

In Table 7, finally, the projection and reciprocity results for the HEXACO variables in the family, work and combined settings are shown. In SRM, projection is operationalized using the correlation between the target ratings t_i and the perceiver ratings p_j . Reciprocity is operationalized using the correlation between the relationship ratings r_{ij} and r_{ji} , with $i \neq j$. The average levels of projection were even lower than the average levels of self-other agreement and assumed similarity, i.e. .10, .20 and .23 in respectively the family, work and combined sample. The average levels of reciprocity were almost zero in all samples. The fourth hypothesis stated that the correlation between the target and perceiver ratings of Honesty–Humility (i.e. projection) should be different from zero. Although for the HEXACO in general the projection effect was weak, the only consistent exception was Honesty–Humility, for which significant projection effects were found in the family, work and combined samples, confirming hypothesis 4. Although there was a significant level of self-other agreement and assumed similarity, for Openness to Experience no significant projection effect was observed.

Table 7. SRM projection (target-perceiver correlations; also called ‘generalized reciprocity’) and dyadic reciprocity (relationship-relationship correlations) for family ($N = 24$), Work ($N = 19$) and All ($N = 43$)

	Projection			Dyadic reciprocity		
	Family	Work	All	Family	Work	All
Honesty–Humility	.24*	.57*	.38**	.24	−.27	.04
Emotionality	.06	.51	.19	−.30	−.22	−.27
eXtraversion	−.10	.18	−.02	.10	−.14	.01
Agreeableness	.37	−.11	.23	−.05	−.00	−.03
Conscientiousness	−.05	−.33	−.11	−.07	.11	−.01
Openness to Experience	.06	.09	.06	−.20	.40	−.02
Mean	.10	.15	.12	−.05	−.02	−.05

* $p < .05$; ** $p < .01$.

⁵Actually, Kenny (1994) refrained from showing correlations involving perceiver ratings with less than 10% perceiver variance because he believed these correlations weren’t particularly meaningful when there was a low level of perceiver variance. Consequently, because the perceiver variance of Emotionality, Extraversion, and Conscientiousness was lower than 10% in all of the samples, assumed similarity results of these three variables are not particularly meaningful.

DISCUSSION AND CONCLUSIONS

This study provides an important update of the discussion on personality perception versus personality judgment. First of all, the results show that when using a personality questionnaire instead of short personality adjective scales, it is possible to obtain substantially higher levels of target variance (e.g. consensus) and lower levels of perceiver variance (e.g. generalized rater bias), supporting a personality judgment conception of personality. Secondly, the SRM results offer support (a) for previous findings showing robust self-other agreement on the HEXACO-PI-R factor scales (Lee & Ashton, 2006), (b) for higher levels of assumed similarity of Honesty–Humility and Openness to Experience (Lee et al., 2009), and (c) for the relative absence of reciprocity effects in personality measurement (Paulhus & Reynolds, 1995). I will discuss these two main findings in turn.

First of all, compared to other studies, this study shows that it is possible to obtain significantly higher levels of consensus and lower levels of generalized rater bias in ratings of personality using Social Relations Analysis. According to this study, Kenny's (1994) 15-20-20 rule for the amount of consensus, generalized rater bias and idiosyncratic rater bias provides an underestimation of the amount of consensus and an overestimation of the amount of generalized rater bias. In this study, on average approximately 35% of the variance was due to consensus (target variance), approximately 15% to generalized rater biases (perceiver variance) and approximately 25% to idiosyncratic rater biases (relationship variance). Additionally, there was evidence for stronger consensus among family members than among work team members, but not much difference in generalized and idiosyncratic rater bias in the two samples. In the introduction, I mentioned three potential reasons for differences in the amount of consensus in this study as compared with earlier studies (i.e. relational characteristics, trait characteristics and instrument characteristics). Both relational characteristics (i.e. higher levels of acquaintanceship among family members compared to work members) and instrument characteristics may have played a role in the higher levels of consensus observed. With respect to trait characteristics, it is interesting to observe that Emotionality, which is probably more easily triggered in a family setting, has higher levels of consensus than Extraversion in the family setting but not in the work setting.

Secondly, although only partial support was found for a lower level of consensus and higher level of generalized rater bias for Honesty–Humility than for other traits, in terms of absolute size, both Honesty–Humility and Openness to Experience showed somewhat lower levels of consensus and relatively high levels of generalized rater bias compared to the other personality variables. Interestingly, both variables show not only high levels of self-other agreement but also relatively high levels of assumed similarity. In a study by Watson et al. (2000) using Big Five scales, Openness to Experience was found to generate high levels of assumed similarity. In Lee et al.'s (2009) study, both Honesty–Humility and Openness to Experience were characterized by high levels of assumed similarity. This study confirms these findings by showing that especially Honesty–Humility and, to a lesser degree, Openness to Experience, but not the other HEXACO variables, are characterized by relatively high levels of assumed similarity in the Social Relations Analysis.⁶ Lee et al. (2009) explain the assumed similarity findings by

⁶Note that the higher assumed similarity of Extraversion using the classic correlation coefficient deviates somewhat from the findings of Lee et al. (2009). Again, it should be noted that the relatively high level of assumed similarity of Extraversion ($r=.37$) in the Social Relations Analysis is less meaningful due to the very low level of perceiver variance in Extraversion (i.e. only 5%; see also footnote 5).

combining two properties of Honesty–Humility and Openness to Experience: (1) the strong associations of Honesty–Humility and Openness to Experience with the two main dimensions of human values, i.e. Self-transcendence and Openness to Change (see also Lee et al., 2009 and Lee, Ashton, Ogunfowora, Bourdage, & Shin, in press, for further evidence of these relations), and (2) by showing that Honesty–Humility and Openness to Experience also generate the highest levels of similarity correlations. This latter finding is supported in this study by the relatively high level of group variance, expressed through ICC, in other-aggregated ratings of Honesty–Humility and to a lesser degree of Openness to Experience.

It appears that Honesty–Humility and Openness to Experience and human values are especially closely linked, with the value of Self-transcendence (versus Self-enhancement) providing the attitudinal expression of Honesty–Humility and the value of Openness to Change providing the attitudinal expression of Openness to Experience. Additionally, it has been shown that friends *are* more similar on values than non-friends (Solomon & Knafo, 2007), which may, among others, be due to positive assortment, and it has been shown that people *perceive* ingroup members to be more similar on values than outgroup members (Schwartz, Struch, & Bilsky, 1990). Together, these findings suggest that similarity and assumed similarity should be especially high for Honesty–Humility and Openness to Experience than for the other dimensions, such as Emotionality, Extraversion, Conscientiousness, and to a lesser degree Agreeableness. Note that of the two HEXACO dimensions that are linked to values, only Honesty–Humility showed significant levels of projection. The absence of projection in Openness to Experience may be due to the somewhat lower level of assumed similarity in Openness to Experience as compared to Honesty–Humility. As argued in the introduction, different types of relations may generate different levels of assumed similarity for Openness to Experience. Especially in dating couples (Watson et al., 2000), but less so in work groups or among family members, people may assume others to be similar on Openness to Experience in order to maintain and strengthen relational harmony. Future research might like to further investigate these differences among the personality dimensions in assumed similarity and projection by investigating the extent to which people expect to maintain relational harmony (cf. Newcomb, 1953) in different types of relationships (e.g. unacquainted strangers, work-group members, friends, family members, dating couples and married couples) when the dyad members are highly similar or dissimilar on these dimensions.

Although not the focus of this paper, an additional interesting finding is the relatively high level of personality-related group variance in both family and work groups, indicative of a 'group personality.' Of course, care should be taken in interpreting these results, but future studies might like to investigate what kinds of processes underlie these relatively high levels of group variance. Possible explanations of the high levels of personality-related group variance in family groups may include assortative mating, genetic overlap (except presumably between spouses), family norms and stereotypic inaccuracies in the ratings of family members (Judd & Park, 1993). Possible explanations of the high levels of personality-related group variance in work groups may include positive assortment through attraction, selection and attrition processes in the workplace (Schneider, 1987) and, as in the family, group norms and stereotypic inaccuracies.

A notable finding is the high level of group-level variance in Honesty–Humility in both self- and other-aggregated ratings in the family groups and in other-aggregated ratings in the work groups. Apart from the self-other agreement, assumed similarity, and projection findings at the within-group level, at the between-group level, the rating of

Honesty–Humility may also be more complex and may involve some or all of the processes described above, or additional ones that have not been mentioned.

To summarize, this study shows that the amount of consensus in personality ratings is relatively high and that the amount of generalized rater bias is relatively low when using questionnaire items in family and work settings. Furthermore, in line with Lee et al. (2009), this study shows that two HEXACO factor scales, Honesty–Humility and Openness to Experience, are characterized by higher levels of assumed similarity, supporting previous findings which point to a positive assortment and value-based explanation for these two personality traits. Overall, the study offers an important update of the Social Relations Analysis of personality and provides interesting avenues for further studies into the trait-specific dynamics of the HEXACO personality traits in general and Honesty–Humility in particular.

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