Applying Multimodal Social Relations Analyses in Personality Pathology Research

Richard Rau[1], Johannes Zimmermann[2], and Mitja D. Back[1]
[1] Department of Psychology, University of Muenster
[2] Department of Psychology, University of Kassel

In this article, we introduce multimodal social relations analysis as a powerful tool for studying personality pathology that tackles several important limitations of existing research. By implementing a design in which groups of participants provide repeated ratings as they interact, researchers can gather data on individuals' mutual perceptions, affective experiences, and interpersonal behaviors in naturalistic social contexts. We demonstrate how the social relations model can be used to analyze and make conceptual sense of these complex, dyadic data and showcase how this may be used to address not only the experiences and behaviors of individuals diagnosed with a personality disorder but also the reactions these individuals evoke in others. We provide recommendations as to what settings and measures might be best suited when designing a study that applies multimodal social relations analysis, and we discuss practical and theoretical implications as well as possible extensions to this method.

Keywords: social relations model, multimodal assessment, interpersonal perception, personality pathology, personality disorder

Personality pathology concerns enduring impairments of self- and interpersonal functioning (World Health Organization, 2020). Focusing on the latter, interpersonal accounts both in personality psychology (e.g., PERSOC framework; Back, 2021; Back et al., 2011) and personality disorder (PD) research (e.g., Fitzpatrick et al., 2021; Hopwood, 2018; Pincus et al., 2020) have emphasized the need for studies focusing on interpersonal patterns rather than individuals. For a PD that is qualified by antagonism, for instance, one should not consider the individual's hostile interpersonal style in isolation but rather try to understand which interpersonal perceptions may trigger this style (e.g., does the person see others as uninteresting or incompetent?) and which interpersonal consequences arise from it (e.g., do others feel insecure or behave passively around this individual?). Following this logic, personality pathology regards dysfunctional ways in which actors perceive others, perceive themselves and feel in the presence of others, and act toward others. Moreover, personality pathology includes specific experiences and behaviors of social partners as well, that is, dysfunctional ways in which others perceive and feel themselves in the presence of target individuals and how they perceive and act toward these individuals. Although

there is a long tradition in psychodynamic and interpersonal approaches to diagnosis and case formulation that considers these diverse aspects of personality pathology in an integrated fashion (Leary, 1957; Schauenburg & Grande, 2012), it is obviously very challenging to assess these aspects and utilize them for research. In this article, we propose multimodal social relations analysis as one particularly promising approach to capture how personality pathology manifests as a complex, interpersonal phenomenon.

Challenges in Studying Interpersonal Aspects of Personality Pathology

Standard assessment contexts are restricted when it comes to capturing individual differences in interpersonal phenomena directly and comprehensively. A first limitation is that personality pathology research still mostly relies on self-reported data. This includes classic questionnaires and also techniques that have more recently been added to the assessment toolbox, such as daily diaries and experience-sampling designs. Bornstein (2003), for example, found that 82% of published studies of PD between 1991 and 2000 relied exclusively on self-report data. Zimmermann et al. (2019) found that 94% of published studies on the alternative *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM–5*; APA, 2013) model of personality disorder (AMPD) are based on a monomethod approach, mostly self-reports. Given that the agreement between self-, informant-, and interviewer methods with regard to PDs and maladaptive traits is only modest (Klonsky et al., 2002; Oltmanns & Turkheimer, 2006; Oltmanns & Oltmanns, 2021), the almost exclusive reliance on self-reports is problematic.

In recent years, a number of studies have included informant- and interviewer-based data as well as direct behavioral observations. For

Richard Rau 🔟 https://orcid.org/0000-0002-1490-8584
Johannes Zimmermann 🔟 https://orcid.org/0000-0001-6975-2356
Mitja D. Back 🔟 https://orcid.org/0000-0003-2186-1558

example, several longitudinal studies in clinical samples have combined self-reports of PDs with informant-reports and/or structured interviews, enabling to determine the incremental predictive validity of each method (Cruitt & Oltmanns, 2018; Klein, 2003; Samuel et al., 2013). The overarching pattern of results from these studies suggests that each method can indeed make a unique contribution to predicting variables such as future psychological symptoms, physical health, global functioning, and social adjustment. Other studies in samples of young adults (students or military recruits) used more elaborate methods, such as peer nomination of PD characteristics in residential groups (Fiedler et al., 2004), standardized role plays in which performance was evaluated by independent observers (Leising et al., 2011), or observed interpersonal behaviors across multiple laboratory interactions (Kaurin et al., 2018). Similarly, these authors concluded that capturing PDs should go beyond self-report and that a multimethod approach seems worthwhile for investigating interpersonal aspects of personality pathology.

A second limitation of many previous approaches is that they draw on decontextualized and/or artificial assessment contexts. For example, retrospective self- and informant reports usually focus on situation-unspecific ways of behaving and experiencing, and in standardized behavioral tasks such as the Trier Social Stress Test (Kirschbaum et al., 1993), individuals have to perform on their own or for a neutral interviewer. Although these approaches allow for a highly standardized assessment, they lack the immediate interactive nature of interpersonal situations in which PDs manifest in reality.

A third limitation regards the almost exclusive focus of previous research on the patients' dysfunctional affective and behavioral patterns. There is comparatively little empirical insight into patients' *perceptual* patterns (i.e., how do they typically perceive others?) let alone the affective responses, perceptions, and behaviors they typically evoke in their interaction partners. Thus, although some noteworthy exceptions do exist (e.g., Barnow et al., 2009; Colli et al., 2014; Friedman et al., 2006, 2007; Hepp et al., 2021; Lukowitsky & Pincus, 2013; South et al., 2005), there is still a striking mismatch between the richness of interpersonal phenomena that are hypothesized to contribute to the emergence and maintenance of personality pathology (Fitzpatrick et al., 2021; Hopwood, 2018) and the simplicity of methods commonly used to study them. As such, to do justice to the complex and inherently interpersonal nature of personality pathology, a multimodal and truly interactive assessment setting is needed.

The Round-Robin Design as a Multimodal and Interactive Assessment Context

The round-robin design is a straightforward way to assess multimodal data in a truly interactive setting (Kenny, 1994, 2019). The idea is to have research participants interact in groups of at least four members and to collect bidirectional data not just on each group member but on each possible dyad within the group. For example, participants could (anonymously) indicate how they perceived each group member's intelligence on a scale from 1 to 10 after a joint discussion on some topic. They could also indicate for each group member how intelligent they thought this person would see them (a so-called *metaperception*). In addition to these perceptions, researchers may also collect dyadic behavioral data, for instance, by videotaping the group discussion and later coding for active listening behaviors such as nodding or expressing agreement. Note that each participant's active

listening behaviors would be recorded separately depending on who was speaking. An alternative to group interactions are multiple dyadic interactions. Instead of having the whole group interact jointly, one could observe all possible dyads interacting one-on-one. In this scenario, it is also possible to assess self-perceptions and affective reactions that are dyad specific. For instance, after discussing some topic with each of the other group members one-on-one, participants could indicate how competent (self-perception) or how aroused (affective reaction) they felt immediately after each interaction.

The Social Relations Model

Kenny's social relations model (SRM; Kenny, 1994 and 2019) provides a comprehensive conceptual and statistical framework for making sense of the complex data resulting from a round-robin design. Here, we will focus on the model's core concepts, but we provide a tutorial for running a social relations analysis and references to detailed SRM introductions as an online supplement (https://osf.io/trcyv/).

The core idea of the SRM is that any dyadic data point reflects to some extent something about the person who provided the rating or showed the behavior and to some extent something about the person who was being rated or who was the interaction partner. In the case of perceptual data, these components are called the *perceiver effect* and the *target effect*, respectively. The perceiver effect reflects how a person perceives others on average (e.g., how much Ann perceives others as intelligent), whereas the target effect reflects how a person is seen by others on average (e.g., how much others perceive Ann as intelligent). In the case of behavioral data, how a person behaves toward others on average is called the *actor effect* (e.g., how much Ann listens actively when with others), whereas the behavior a person evokes in others on average is called the *partner effect* (e.g., how much active listening behaviors others display while Ann speaks). Social relations analysis allows one to estimate people's individual SRM effects from round-robin data. If dyad-specific self-perceptions or affect-ratings are assessed, one can also estimate perceiver and target effects for these variables. That is, one could, for example, learn how much a person generally sees themselves as intelligent when interacting with others (perceiver effect self-perception), how much a person generally tends to feel nervous with others (perceiver effect affect), how much a person evokes low intelligence self-perceptions in others (target effect self-perception), and how much a person evokes nervousness in others (target effect affect).

Understanding Personality Pathology as SRM Effects

Social relations analysis is an optimal tool to empirically grasp manifestations of interpersonal dysregulation in a truly interactive setting. In the following text, we provide a general framework of SRM effects as measures of individual differences in interpersonal functioning, apply this framework to selected PD traits, and outline a range of designs and measures that can be applied in clinical context.

Figure 1 depicts processes typically investigated in interpersonal situations (see Hopwood [2018] for a review) and includes SRM effects as assessments of individual differences in all involved variables. These SRM effects can be assessed by round-robin designs as described earlier. Specifically, by combining the perspectives of self, others, and observers, round-robin studies may illuminate the perceptual, affective, and behavioral patterns that characterize the interpersonal dynamics found in social interactions involving individuals

Figure 1
Social Relations Model Effects Within the Interpersonal Situation
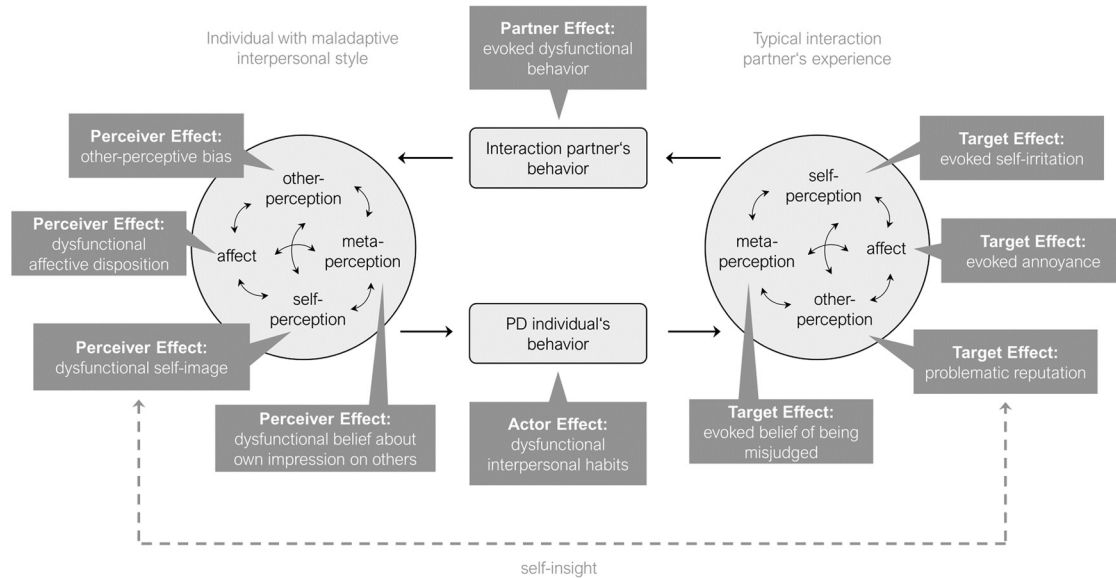
with personality pathology. For instance, the perceiver effect may be conceptualized as a measure of bias in the perception of interaction partners, of an individual's dysfunctional affective disposition, of a dysfunctional self-image, or of a dysfunctional belief about one's own impression on others. The target effect may be conceptualized as a measure of problematic reputations among interaction partners, evoked beliefs of being misjudged, evoked annoyance, or evoked self-irritation. When applied to behavioral data, the actor effect may be conceptualized in terms of dysfunctional habits, and the partner effect may be conceptualized as evoked dysfunctional behaviors. It is also possible to relate certain SRM effects to each other to operationalize more complex constructs. For example, discrepancies between self-perception and reputation may indicate a lack of self-insight.[1]

It is important to note that there are at least two ways in which these variables measure something dysfunctional. On the one hand, the content of the particular trait, behavior, or affect being assessed could be inherently maladaptive. For example, the trait of *overconfidence*, the behavior of s*houting at others* or the affect of feeling *stressed* are semantically entangled with potentially maladaptive aspects, in the sense that the trait is out of touch with reality, the behavior violates an interpersonal norm, and the affect has unfavorable consequences for oneself. On the other hand, even on more neutral dimensions (such as *self-confidence*, *speaking volume*, or *affective arousal*), PDs could leave detectable traces in individuals' SRM scores in terms of characteristically high or low perceiver and target effects.

Exemplary Applications

To illustrate the conceptual utility of SRM effects when studying the dysfunctional interpersonal patterns typically found in individuals with a PD diagnosis, we now describe two examples. Consider first a PD qualified by high antagonism (or dissociality according to *International Classification of Diseases, 11th Revision, ICD-11*; World Health Organization, 2020). Based on their generally negative perception about other people, individuals with this kind of pathology

might frequently evoke a dysfunctional dynamic that eventually renders many everyday social interactions into conflicts. A specific case is illustrated in Box 1.

Table 1 spells out how Don's pattern of interpersonal dysregulation might manifest in an interpersonal situation and how this pattern might be captured in SRM effects. Note that, in addition to the manifestations spelled out in the table, another manifestation would be the discrepancy of self-perception and target effects such that the PD individual's self-grandiosity (e.g., high explicit self-esteem) is not backed up by how they are viewed by others (e.g., low target effect for liking).

Consider as another example a PD qualified by negative affectivity and detachment. Based on their sense of anxiety, vulnerability, and mistrust, individuals with this kind of pathology might evoke a dysfunctional dynamic that eventually leaves them ignored and aggrieved in many everyday interactions. A specific case is illustrated in Box 2.

Table 2 spells out Jenny's pattern of interpersonal dysregulation. In addition to the manifestations spelled out in the table, another manifestation would be the discrepancy of self-perception and target effects such that the individual's self-insecurity (characterized by low agency) is not reflected in how they are viewed by others (low communion).

Measuring Experiential and Behavioral SRM Components

Settings

As mentioned, there are two different settings in which round-robin designs can be implemented so as to measure experiential

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[1] Note that examining associations between discrepancy measures and third variables requires special statistical approaches that we cannot elaborate on here (Humberg et al., 2019).

Box 1: Fictitious Case of a Young Man Diagnosed With a Personality Disorder Characterized by High Antagonism

Don is a young man who has trouble maintaining close friendships or intimate relationships and who has lost four jobs in the past 2 years after colleagues complained about his rudeness and his inability to cooperate constructively. Although he claims not to suffer from the absence of close relationships and is convinced that his previous jobs were "simply not the right match," Don seeks help from a therapist after being pressured by his parents and his sister to "do something about these issues." The therapist finds Don's interpersonal problems to be rooted in an unrealistic sense of grandiosity and entitlement. Based on this sense, Don can be obsessed with trying to impress others such that he tends to lose sight of what people around him feel, believe, or desire and occasionally even turn openly contemptuous and insulting when he feels under attack. This tendency makes others feel uncomfortable around Don, and sooner or later lets them distance themselves and eventually turn their back on him.

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and behavioral SRM components in a truly interactive environment. The first option is that participants interact jointly by completing a group task such as playing an icebreaker game and/or discussing a controversial topic and/or solving a problem. To obtain behavioral data, these interactions should be videotaped and later be coded based on a systematic scheme (see the following text). To allow for both a close consideration of an individual's behavior and the interaction context in which it is expressed, we recommend to include individual as well as group-based camera perspectives where possible. To obtain perceptual data, participants should be asked to rate each other after the interaction either in a pen-and-paper format or, if possible, on tablets. It should be made sure that the anonymity of the perceivers' ratings is warranted (e.g., by seating participants sufficiently distantly) and that there is no ambiguity as to who a rating is supposed to refer to (e.g., by using seat numbers rather than first names when indicating the target of a rating).

The second option is the use of multiple dyadic interactions. Here, participants will complete a brief one-on-one interaction with each member of their round-robin group. Typical instructions could be "Talk about whatever you like for 5 minutes" or "Try to get to know each other as well as possible within 5 minutes." Again, these interactions should be videotaped and later coded, and participants should provide their perceptions of their interaction partner immediately after each interaction. It is important to note that a setting with multiple dyadic interactions differs in several respects from a group-interaction setting. First, the dyadic setting may trigger different interpersonal motives (e.g., intimacy, closeness) than the group setting (e.g., belongingness, competence). Depending on the specific PDs under study, either setting might be best suited to make visible the relevant dysfunctional interpersonal patterns. For instance, extensive bragging by an individual with a PD qualified by antagonism might become best visible in a group setting, whereas bizarre beliefs by an individual with a PD qualified by psychoticism might require one-on-one interactions to become openly expressed. Second, dyadic settings allow for a direct, straightforward assessment of partner-specific self-perceptions (e.g., "How relaxed vs. nervous did you feel with this person?"). Whereas such an assessment can, in principle, also be made in a group setting, this assessment would be based more strongly on participants' hindsight and would thus arguably be less valid. Therefore, dyadic settings may be the more attractive option whenever concepts such as relational self-schemas are of interest.

Table 1

Illustrative Example for a Fictitious Individual "Don" With a Personality Disorder Characterized by High Antagonism

Modality	Phenomenological description	Social relations model operationalization
	Don's experience:	
Self-perception	Thinks of himself as something special	High perceiver effect for positivity (across traits); high explicit self-esteem
Other-perception	Thinks others are uninteresting, lazy, and incompetent	Low perceiver effect for positivity (across traits); low perceiver effect for liking
Metaperception	Thinks others fail to recognize his/her charm and talents	Low perceiver effect for positivity (across traits)
Affect	Alert, vivacious	Neutral perceiver effect for affective valence, positive perceiver effect for affective arousal
Behavior	Does not listen to others, criticizes others, speaks a lot, brags	High actor effect for agentic behavior; low actor effect for communal behavior
	Don's interaction partners' experiences:	
Self-perception	Insecure, question their competence and social value	Low target effect for agency; high target effect for nervousness; low target effect for competence
Other-perception	Think Don is rude and egoistic	Low target effect for positivity (across traits); low target effect for liking
Metaperception	Assume Don dislikes them and looks down on them	Low target effect for metaliking
Affect	Annoyance, angriness	Low target effect for affective valence, high target effect for affective arousal
Behavior	Make jokes about Don behind his back, passive aggression	Low partner effect for agentic behavior; low partner effect for communal behavior

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Box 2: Fictitious Case of a Middle-Aged Woman Diagnosed With a Personality Disorder Characterized by Negative Affectivity and Detachment

Jenny is a middle-aged, married woman working in a logistics center. She has serious worries about losing her job, as rumors concerning a cut on personnel are becoming louder. She believes to be "on the black list" because her boss "constantly criticizes" her and because she never managed to establish social ties with any of her colleagues, whereas most of them enjoy socializing at work a lot. To protect herself from overhearing gossip about her, she wears earplugs playing music at work. Outside of work, she reports having no social contacts besides occasional messaging with a former classmate from elementary, Tina. Yet, Jenny reports it is "obvious" that Tina stays in touch out of a sense of responsibility rather than actual personal interest in her, which is why she cannot enjoy Tina's friendship. Another reason for Jenny to seek therapeutic help is a marriage crisis. Since she has found out that her husband "heavily flirts" with their neighbor, Tammy, the thought of losing him is driving her crazy, as she would be "hopelessly overburdened with getting anything done without him." She reports trying to hide this worry from her husband and instead "let him feel that what he does is wrong."

Measures

There is a wide range of measures that can potentially be applied to assess the outlined experiential and behavioral SRM components. The specific content of these measures will depend on the clinical phenomena of interest and the clinical settings and resources available. However, it is important to note that round-robin designs generally require the application of much shorter measures than could potentially be applied when collecting nondyadic data because each participant is required to complete the measure not just once but repeatedly for each interaction partner. Given this constraint, we focus our recommendations on ultrabrief measures of core constructs that have been found to be most relevant and useful in previous work on personality pathology and interpersonal perception. Of course, this does not preclude the inclusion of more comprehensive and more specific measures wherever necessary and possible. Unless stated otherwise, we recommend the use of 6-point or 7-point Likert scales for all measures.

Assessment of Self-Perceptions

The most general aspect of self-perception is evaluation—how negatively versus positively someone perceives him/herself in the moment. This form of self-satisfaction is often referred to as state self-esteem and can be assessed with items such as "Right now, I am satisfied with myself." Given that this is a self-report, it might be specified that this assessment concerns *explicit* self-esteem.

Moving beyond mere evaluation, the most relevant content dimensions of interpersonal self-perception are *agency* and *communion*. These dimensions can be understood as two orthogonal axes spanning a circular space, the *interpersonal circumplex* (IPC), in which any relevant interpersonal phenomenon, including self-perceptions, can be located (Kiesler, 1983; Leary, 1957; Pincus et al., 2014; Wiggins, 1979). The agency axis distinguishes phenomena in terms of how relevant they are for promoting the self or for *getting ahead*, whereas the communion axis distinguishes phenomena in terms of how relevant they are for promoting social ties or for *getting along* (Bakan, 1966). For the agency dimension, prototypical adjectives anchoring the low pole would be *submissive*, *uncertain*, and *shy*, whereas prototypical adjectives anchoring the high pole would be *self-assured*, *assertive*, and *confident*. For communion, the poles could be anchored with the adjectives *cold, hostile,* and *quarrelsome* and *warm*, *friendly, compassionate*. The most parsimonious way of assessing interpersonal self-perceptions is the use of two single items, one for agency and one for communion. To mitigate losses in construct width, we recommend

Table 2

Illustrative Example for an Individual With a Personality Disorder Characterized by Negative Affectivity and Detachment

Modality	Phenomenological description	Social relations model operationalization
	Jenny's experience:	
Self-perception	Believes to be boring, incompetent, and worthless	Low perceiver effect for positivity (across traits); low explicit self-esteem
Other-perception	Idealizes others' achievements and competences	High perceiver effect for agency and competence
Metaperception	Thinks others criticize and dislike her	Low perceiver effect for metaliking
Affect	Anxious, disappointed, nervous	Low perceiver effect for affective valence
Behavior	Remains silent, avoids eye-contact, disengages from conversation	Low actor effect for agentic behavior; low actor effect for communal behavior
	Jenny's interaction partners' experiences:	
Self-perception	Neutral	—
Other-perception	Think Jenny is cold and aloof	Low target effect for communion; low target effect for liking
Metaperception	Assume Jenny does not care about them	Low target effect for metaliking
Affect	Annoyance, unpleasantness	Low target effect for affective valence
Behavior	Attend increasingly less to Jenny, eventually lose interest in her	Low partner effect for communal behavior

bipolar scales with several adjectives as anchors (e.g., "Right now, I perceive myself as submissive, uncertain, shy versus self-assured, assertive, confident" and "Right now, I perceive myself as cold, hostile, quarrelsome versus warm, friendly, compassionate.").

Note that there are also many relevant distinctions within the IPC that are not made along either of the two primary axes. Rather, they reflect different combinations of agency and communion. For instance, the combination of high agency and high communion could be described with the adjectives *sociable*, *gregarious*, and *communicative*, whereas the combination of low agency and low communion could be labeled with *reserved*, *aloof*, and *introverted*. Similarly, high agency/low communion could be characterized with the terms *arrogant*, *calculating*, and *egoistic* and low agency/high communion could be described with *compliant*, *ingenuous*, and *cautious*. In research scenarios where there is a clear substantive focus on any of these "mixed" dimensions, assessing them with separate items will be a good choice. Otherwise, opting to tap this content by combining the ratings obtained for the primary axes of agency and communion might be a reasonable and economic alternative, although this will of course involve a certain loss in construct fidelity. Another option would be the use of the interpersonal grid, a rectangular arrangement of 9×9 squares, anchored with eight interpersonal adjectives, on which participants are asked to mark a single square that best describes their current interpersonal style (Moskowitz & Zuroff, 2005).

One self-perceptive aspect that is not fully captured in the IPC but that might still be relevant in many interpersonal situations concerns *competence*. Even though different specific competences may be relevant in different social contexts or for different tasks, we believe that adding a global assessment of perceived intellectual ability (e.g., "Right now, I perceive myself as competent, intelligent, capable.") will often be a valuable extension to the classic IPC dimensions of agency and communion.

Assessment of Other-Perceptions

As for self-perceptions, the most basic dimension of other-perceptions is evaluation and perhaps the most straightforward way of capturing other-evaluation is an assessment of liking (e.g., "I like this person"). Alternatively, one might score the perceiver's positivity versus negativity toward the target by aggregating ratings across a set of content-related items while aligning their social desirability. For instance, high positivity would be found for a perceiver who sees a target as self-assured (high agency), as well as compassionate (high communion), and intelligent (high competence). Although positivity is closely linked to liking, it is conceptually distinct. For example, some perceivers may like less self-assured, less compassionate, or less intelligent interaction partners better than more self-assured, more compassionate, or more intelligent ones. In terms of capturing specific content domains, we recommend using other-report versions of the abovementioned self-report items.

Assessment of Metaperceptions

Metaperceptions—what someone thinks other people think about him or her—can be of focal interest in personality pathology research. As for self- and other-perceptions, liking or positivity, agency, communion, and competence appear to be the most important domains to consider for the assessment of metaperceptions. A generic metaperception item-stem could be "This person thinks I am . . ." and this could be complemented with the same anchors as were recommended for the assessment of self-perceptions above.

Assessment of Affect

Regarding affect, the most parsimonious assessment is the affect grid, capturing affective states as a combination of the two orthogonal axes of arousal (i.e., how alert vs. fatigued an affective state is experienced) and valence (i.e., how positive vs. negative an affective state is experienced; Russell et al., 1989). Specifically, individuals indicate their affective state by a mark on a 9×9 grid spanning high activation and high valence (*joy*, *enthusiasm*), low activation and high valence (*contentment*, *peacefulness*), low activation and low valence (*disappointment*, *sadness*), and high activation and low valence (*anger*, *distress*). Whenever a more fine-grained assessment of particular affective states is required, this can be achieved by a separate use of regular rating scales.

Assessment of Behavior

Based on videotaped interactions, a large range of behavioral codings is possible. Although behavioral codings can be time-consuming, there are less constraints concerning the number of ratings or codings compared to the constraints for experiential assessments discussed previously. This is because behavioral codings are provided by outside observers rather than provided in situ by the participants themselves. As such, it is not a strict requirement that ultrabrief adjective-based scales be used.

There exist very few established standardized behavioral coding schemes for interactive settings, and most are developed in an ad hoc fashion and tailored to the specific assessment context. Some coding schemes focus on dyadic settings (Funder et al., 2000; Sadler et al., 2020), and others on group interactions (Grünberg et al., 2018), and they operate on different levels of specificity, ranging from a microlevel (e.g., counting specific behavioral acts such as the number of smiles or nods), to a mesolevel (e.g., rating specific behavioral tendencies such as the degree of facial expressiveness), to a macrolevel (e.g., rating overarching behavioral tendencies such as the degree of overall expressiveness). Given that the required codings in a round-robin study will be rather extensive due to the dyadic nature of the data, mesolevel and often only macrolevel approaches will be feasible.

Besides their level of specificity, existing coding schemes also vary with regard to the behavioral content domains they cover. To match what is captured in the perceptual and affective measures described earlier, we recommend assessing behaviors that tap the IPC axes. This might be complemented by behaviors indicative of competence and nervousness, which are factors that tend to capture unique behavioral variance in interactions (Breil, Forthmann, et al., 2022; Breil, Lievens, et al., 2022; Leising & Bleidorn, 2011). Meso-level indicators of high agency may include behaviors such as "the person expresses firm, strong preferences" or "the person makes comments or replies that 'pop out' quickly and energetically," whereas comparable indicators of high communion may include "the person expresses understanding or forgiveness for the other's actions" or "the person is quick to express approval or acceptance of the other" (cf. Sadler et al., 2020). Comprehensive selections of behavior-based IPC items that have been successfully validated with clinical samples can be found in the articles by Moskowitz (1994) and Sadler et al. (2020) and will provide a good basis to build

coding schemes optimized to the researchers' specific needs. One existing coding scheme that provides micro-, meso-, as well as macroindicators for each behavioral domain of the IPC as well as for competence and nervousness in the context of group interactions is the Münster Behavioral Coding System (Grünberg et al., 2018).

Practical Considerations

So far, we have highlighted how round-robin studies can tackle central limitations of previous PD research by being inherently multimodal (i.e., by combining the perspectives of self, other, and observer) and ecologically valid (i.e., by assessing data in a truly interactive setting). Besides, we have sketched basic setups and measures that might be used when designing a round-robin study. But there may still be a few practical burdens to consider. One concern should be the optimal round-robin group size. Technically, social relations analysis is possible when groups consist of at least four individuals. However, depending on the specific phenomena under study, reliabilities for SRM effects may turn out to be poor in small groups such that using eight-person to 10-person groups appears to be a much better choice. Also, based on the prevalence of PDs (Volkert et al., 2018), most groups of this size would be expected to include one individual with clinically relevant personality pathology if participants are sampled representatively from the general population. Thus, although representative sampling is certainly challenging, collecting data in group sessions with eight to 10 participants would arguably not add excessive extra demands while greatly boosting the potential to yield ecologically valid insights on interpersonal aspects of PDs. An alternative, perhaps more pragmatic approach to representative sampling could involve a stratification strategy, such that half of the members of each round-robin group are drawn from a clinical population whereas the other half are drawn from a nonclinical population (see Christensen et al. [2003] for an example with social phobia patients). Another approach may involve collecting data in collaboration with local psychotherapeutic, psychiatric, and forensic institutions (e.g., Mahaffey & Marcus, 2006). Although these types of cooperation can be challenging to initiate, many such institutions offer group therapy and might be able to and interested in providing a suitable setting to assess valuable multimodal data in a real-life social context (see Christensen & Feeney [2016] for a detailed discussion of SRM applications in group therapy).

Another pragmatic concern might be that although some dysfunctional interpersonal dynamics observed in individuals diagnosed with a PD do manifest openly and quickly, many might manifest in more subtle ways and in more intimate relationships over the course of months or years. Although this reflects a major challenge for round-robin designs, we believe that it is worthwhile for researchers to explore ways to implement less extensive designs that still allow for the analysis of dyadic data. For example, researchers might make use of the (unfortunate) fact that many patients with severe PDs are in professional treatment repeatedly or even permanently over quite long periods of time, often years, such that they interact intensely with many different staff including nurses, therapists, and doctors throughout their clinical history. Making these individuals, that is, both long-term patients and clinical staff participate in a study that collects dyadic interpersonal perceptions and affect may uncover these patients'

dysfunctional interpersonal patterns. This type of design is technically not a round-robin (because professionals would not be asked to rate one another) but a block design, thus requiring slightly different statistical treatment (cf. Kenny et al., 2006). Nevertheless, patients' own reports on their experience would not only be complemented by several others' reports of the patients' experiences but also by the patients' perceptions of multiple others and by the reports of multiple others on their own experiences with these patients. Thereby, it might be possible to uncover how biased expectations, evoked irritation, beliefs of being misjudged, and so forth manifest in actual social relationships that have developed over comparatively long periods of time.

Implications for PD Assessment and Research

The question arises to what extent a multimodal assessment of interpersonal patterns using round-robin designs is also suitable for diagnostic practice. Conceptually, it ties into longstanding approaches to clinical assessment in individual cases that aim to uncover the maladaptive interpersonal patterns that underlie and maintain a person's PD symptoms (Schauenburg & Grande, 2012). For example, operationalized psychodynamic diagnosis (OPD Task Force, 2008) provides a framework for reconstructing how the patient experiences others (e.g., as hostile or cold) and themselves (e.g., as defending), and how others, in contrast, perceive the patient's behavior as a difficult relational encounter, which in turn may evoke the feared response (e.g., rejection or withdrawal). The overarching goal is to understand the patient's problematic behavior as part of a self-reinforcing vicious circle in relationships. Clinicians find this perspective useful because it helps establish an individualized case formulation and plan therapeutic interventions (Ehrenthal & Benecke, 2019). With this in mind, it would be promising to use round-robin designs for clinical assessment in contexts where this is possible (e.g., group therapy or inpatient therapy). Instead of experts reconstructing a patient's interpersonal patterns based on their descriptions as well as unstructured observation of the interaction within an interview situation, patients could describe each other in groups with standardized items as explained earlier such that SRM effects could be estimated. This type of application would require developing a corresponding digital platform that automates and facilitates data entry, analysis, and feedback of results. Implementing round-robin designs in a user-friendly manner could improve the psychometric quality and degree of standardization of clinical assessment of interpersonal patterns while preserving their clinical utility.

For PD research, opportunities arise with the collection of multimodal data in round-robin designs to address perennial questions and current controversies. These include, for example, the question of the central features of PD, that is, features that are common to all PDs and at the same time distinguish them from other mental disorders. In this regard, the new dimensional models of PD in *DSM–5* Section III (APA, 2013) and *ICD-11* (World Health Organization, 2020) highlight impairments in self- and interpersonal functioning. As Pincus et al. (2020) pointed out, this refers not only to aspects of self- and affect regulation but also to genuine interpersonal patterns that go beyond the individual. These include, on the one hand, impairments in interpersonal field regulation (such as lack of prosocial standards, ignorance of others' perspectives, unrealistic beliefs about the effect of one's own behavior on others, and conflicting

relationships), and, on the other hand, perceptual distortions (such as incoherent or distorted self-image, inability to reflect own mental processes, and limited understanding of others' experiences). From our point of view, it seems possible to operationalize many of these core features of PD on the basis of SRM effects. For example, consistent with Figure 1, perceptual biases might be evident in pronounced perceiver effects in other-perception or in large discrepancies between self-perception and reputation, whereas impairments in interpersonal field regulation might show up in strikingly dysfunctional actor and partner effects. In this way, one could empirically test which of these interpersonal patterns are truly specific to PD, both compared to healthy controls and to other mental disorders.

Other questions could relate to stylistic aspects of PD, which are represented in the categorical models by the specific PD diagnoses and in the new dimensional models by the maladaptive trait domains. There already exists much research on different interpersonal patterns for different PD categories, but this research is often based on self-reports of one's own interpersonal problems (Wilson et al., 2017), whereas perceptual biases regarding others as well as the effect of one's own behavior on others are considered less often. However, several clinical theories of PD emphasize that patients can elicit quite different emotional responses (or "countertransference reactions") in their peers and therapists according to their predominant interpersonal style (Hopwood, 2018; Kernberg, 1984). Following up on one of our example cases, for instance, different hypotheses concerning partners' responses toward an interpersonal style such as Jenny's (Box 2) could be generated and tested. Specifically, negative affectivity and detachment may indeed evoke annoyance and distancing in others but could also elicit positive, caring feelings. Testing such hypotheses using multimodal round-robin designs would go beyond previous studies of emotional responses to specific PDs (Colli et al., 2014), which are often limited to global, retrospective, monomethod assessments.

Outlook

To this point, we have outlined and discussed multimodal social relations analysis in a rather basic form. Although it allows one to directly grasp specific dysfunctions that are at the core of personality pathology even in this form, there exist a few possible extensions that may allow for more fine-grained and comprehensive investigations of maladaptive interpersonal patterns.

A first important extension concerns new developments in social relations modeling (Nestler et al., 2020), allowing for more advanced multivariate analyses of round-robin data. Research suggests that SRM effects across multiple items tend to have a complex dimensionality such that a perceiver effect for the item "intelligent," for example, partly reflects the perceiver's tendency to see others as competent but partly also reflects the tendency to see others globally positively (Heynicke et al., 2022; Rau et al., 2021; Srivastava et al., 2010). As such, modeling latent factors for different perceiver and target effect components and investigating their relationships with markers of psychopathology in a social relations structural equation model framework opens up promising perspectives.

A second promising extension is to assess round-robin data repeatedly over time to capture individuals' temporal trajectories of perceiver and target effects. This could reveal whether or not interpersonal dysregulation manifests not only in stable maladaptive patterns but also in maladaptive changes in response to changing interpersonal environments. For instance, some individuals with PD may show a pattern of rigidity when forming impressions of others (i.e., they might not let go of initial perceiver effects even in the wake of new information about targets) or some might be conspicuously responsive to everything they learn about others (i.e., their perceiver effects might be highly unstable over time). This could be done by using a two-step approach where SRM effects are extracted separately for each measurement time point and are then treated as observed variables in latent growth models or autoregressive models (cf. Rau et al., 2019; Rau et al., 2022) or by applying longitudinal social relations structural equation modeling (Nestler et al., 2022).

A third extension to the presented approach pertains to the inclusion of relationship effects, the third component of the SRM that captures unique reactions of individuals to specific other individuals beyond what is captured by person-level effects. For certain personality problems, it is not only relevant to capture general tendencies such as being overly suspicious toward interaction partners in general or behaving overly shy toward others in general but also to capture idiosyncratic experiences and subsequent behaviors to specific kinds of interaction partners. For example, the borderline interpersonal-affective systems model (Fitzpatrick et al., 2021) suggests that people with borderline PD react overly emotionally, particularly to those interaction partners that show interpersonal threatening behaviors (e.g., social rejection, negative evaluations). Conceptually, such relationship effects are grounded in specific experiential reactions of one person to behavioral expression by the other person (Back, 2021). In other words, relationship effects are driven by circumscribed interactional contingencies, specifically by contingencies between other's behavior and own perception or affect. The stronger variations in social rejection are associated with variations in negative emotions within a person, the stronger this person's contingency. Multimodal SRM analyses also allow to assess individual differences in such contingencies.

A final promising extension concerns the possibility that perceivers might differ in the variance of the impressions they form about targets and that targets might differ in the variance of the impressions they make on others. In the classic SRM, this possibility is not given because the model assumes homoscedasticity of residuals. However, a recent extension to the SRM proposed by Kenny et al., (in press) relaxes this assumption, thus enabling an examination of perceiver differences in *dissimilation* (how variable they see other people) and target differences in *dissensus* (how variable they are seen by other people). Applying these concepts to PD research may uncover additional instances of how interpersonal dysregulation manifests interpersonally.

Conclusion

In this article, we introduced multimodal social relations analysis as a powerful approach to address some limitations of existing research on personality pathology. By implementing a round-robin design, researchers can gather data of mutual perceptions, affective experiences, and interpersonal behaviors from multiple perspectives in naturalistic social contexts in a systematic manner. With the SRM, they have a conceptual and statistical tool at hand with which they can think about and analyze the dyadic data resulting from this setup and with which they cannot only address

the experiences and behaviors of patients but also the reactions these patients evoke in their interaction partners. Research endorsing this approach might go a long way in doing justice to the fact that personality pathology is, at its heart, a matter of interpersonal dysregulation.

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