67 1992

Schmitt, M., Neumann, R. & Montada, L.

Sensitivity to Experienced Injustice:
Structural Equation Measurement and Validation Models

Contents

Abstract

A self-report questionnaire was developed for measuring individual differences in Sensitivity to Experienced Injustice as a trait. The questionnaire consists of four scales measuring the frequency of experienced injustice, the intensitiy of anger in such situations, the intrusiveness of thoughts about the event, and the desire to punish the perpetrator. Using structural equation modeling, the convergent and discriminant validity of this questionnaire was investigated vis à vis two other self report questionnaires, a Situation-Emotion-Questionnaire and a German version (Schwenkmezger & Hodapp, 1989) of Spielberger's State-Trait-Anger-Expression-Inventory (Spielberger, 1988). The Situation-Emotion-Questionnaire consists of unjust and frustrating situations. The person has to rate how angry and how disappointed he or she would feel in these situations. For each of the three questionnaires, a separat measurement model was specified, tested, and compared to competing models. The final model for the first questionnaire has one common trait factor (Sensitivity to Experienced Injustice) and four residual or method factors, one for each of the four scales. The final model for the Situation-Emotion-Questionnaire has two correlated (.47) common trait factors, Emotional Reactivity to Unjust Treatments and Emotional Reactivity to Frustrating Events, and two correlated (.47) emotion method factors, Anger and Disappointment. The final model for the State-Trait-Anger-Expression-Inventory has three common factors: Trait-Anger and Anger-Out are highly correlated (.80); as small negative correlation was found between Anger-Out and Anger-In (-.33); Trait-Anger and Anger-In are uncorrelated. A simultaneous measurement model including all three simple models was specified to estimate the correlation among the trait and the method factors. Most of these correlations support the convergent and discriminant validity of the questionnaires. For example, the highest correlation (.81) was found between the common trait factors Sensitivity to Experienced Injustice and Emotional Reactivity to Unjust Treatments. Furthermore, most of the correlations among the method factors were consistent with theoretical expectations. The advantages of structural equation modeling for analysing the convergent and discriminant validity of measurement instruments are discussed, and this approach is compared to conventional exploratory analyses.

Key Words: Justice - Frustration - Anger - Disappointment - Structural Equation Modeling - Construct Validation - Measurement Model - Multitrait-Multimethod-Model

Experimental and correlational designs have been used in research on distributive and procedural justice. Experimental studies have been aimed at the identification of situational and social factors (a) on preferred rules for the resolution of social conflicts, (b) on the distribution of goods and values and (c) on the perceived justice or fairness of both the procedures and results of distributions (Mikula, 1980; Törnblom, in press). In this type of experimental research, individual differences in distributive behavior or in reactions to given distributions are usually of secondary interest and treated as "error" variance. By contrast, correlational justice research emphasizes individual differences in justice related variables because they provide valuable information for understanding the psychological processes underlying the preference for certain procedures of conflict resolution, the choice for specific distribution principles, as well as emotional and behavioral reactions to actual distributions and the way they came about.

Experimental and correlational research strategies are basically aimed at the same goal (Cronbach, 1975). In the realm of social justice, they are intended to identify the reasons why individuals behave or feel in certain ways vis à vis distribution conflicts which arise from limited resources. Whereas experimental research is usually focused on factors outside the individual, correlational research tries to explain why individuals behave and feel differently under the same situational conditions (Schmitt, 1980).

The primary advantage of experimental research is that it makes possible causal interpretions of the observed associations between independent and dependent variables; the former affect the latter. By contrast, the status and causal ordering of variables remains uncertain in correlational data, at least from cross-sectional research. On the other hand, correlational designs make possible to include as many variables as are deemed relevant in the explanation of individual differences in justice related behaviors and emotions. A major disadvantage of experimental research is the limited number of independent variables that can be investigated simultaneously. Therefore, complex interactions effects in the process of justice related behaviors and emotions can hardly be detected.

Correlational and experimental designs should not be considered as competing paradigms. Rather, they can complement each other in fruitful ways (Schmitt & Montada, 1982). For example, experimental studies can be refined if individual difference variables are included as organismic covariates or moderators. Consider the motivation to believe in a just world as an example (Lerner, 1980). It is known that individuals who suffer from bad luck will oftentimes be derogated by observers (Lerner & Miller, 1978). This kind of secondary victimization has be attributed to a defensive motivation on behalf of the observer. He or she wants to make sure that a similar fate will not happen to him. Therefore, he or she declares the victim's fate to be just and deserved in the sense that bad people deserve bad fates - which implies that good people, like the observer, will be lucky. Since the (motivation to) belief in a just world varies between individuals (Dalbert, Montada, & Schmitt, 1987; Rubin & Peplau, 1975), it is reasonable to assume that the extent of derogating in-

nocent victims varies as a function of the observer's belief in a just world. In fact, such a moderating effect has been found for scales measuring belief in a just world (Schmitt et al., 1991; Zuckerman, Gerbasi, Kravitz, & Wheeler, 1975).

Besides belief in a just world, justice related individual difference constructs and measures include attitudes towards different distribution rules such as equity, equality, and need (Montada, Schmitt, & Dalbert, 1983; Schneider, Reichle, & Montada, 1986; Herrmann & Winterhoff, 1980). The construct validity of these scales has been evidenced in both experimental (Herrmann & Winterhoff, 1980; Winterhoff-Spurk & Schwinger, 1984) and correlational investigations (Montada, Schmitt, & Dalbert, 1986; Montada & Schneider, 1989). Just like belief in a just world and various trait constructs in personality (e.g., Repression-Sensitization, Byrne, 1964), the conceptualization of equity, equality, and need as interindividually varying values has emerged from general psychological justice theories and related research approaches. For example, equity theory has claimed that input output proportionality is a universal or general criterion for the distribution of scarce resources (Walster, Berscheid, & Walster, 1973). However, individuals may to differ substantially in their attitude towards this criterion (Huseman, Hatfield, & Miles, 1987).

In this article, we propose to add the construct of Sensitivity to Experienced Injustice (SEI) to the set of individual difference dimensions in justice theory and research. Huseman et al. (1987) suggest that individuals differ in the balances in outcome/input ratios. They suggest three prototypes representing marked positions on the dimension of equity sensitivity: "Benevolents" prefer outcome/input ratios that are smaller than those of others; "entitles" prefer outcome/input ratios that are larger than those of others; "equity sensitives" are distressed whenever their outcome/input ratio differs from those of others.

Our construct of Sensitivity to Experienced Injustice differs from the Huseman et al. (1987) propositions in that justice is not equated (i.e., confounded) with equity but may be based on any justice norm, equity, equality, need, or criteria for procedural justice. So far, individuals' sense of being treated injustly by others has only been conceptualized and investigated from a general psychological perspective. For example, Mikula (1986) has conducted a survey study to identify the kind of social settings in which individuals experience unjust treatments, what kind of social relations typically exist between the actor and the victim of an unjust treatment, and which emotional consequences as well as behavioral intentions follow in reaction to being treated unfairly by another person. Mikula (1986) found, for example, that anger, rage, and indignation were the most common emotional reactions reported by his subjects. In two additional studies, using role playing techniques, Mikula (1986) investigated the cognitive processes involved in situations of unfair treatment as well as differences in these cognitions between perpetrators, victims, and unaffected observers. Mikula (1986, p. 122) concludes from the data of his studies that "it seems reasonable to assume that individual differences will explain a considerable amount of variance."

We assume that one important dimension of individual differences is the extent to which someone is sensitive to unjust treatment by others. To our knowledge, empirical research on individual differences in the sensitivity to injustice has been limited so far to the perspective of the unaffected observer and the perpetrator. In studies by our research group (Montada et al., 1986; Montada & Schneider, 1989), substantial individual differences were found between subjects' guilt reactions towards people suffering unjust fates (e.g. physically handicapped, people living in Third World countries). Given such findings and anecdotes from everyday life, it seems likely that individual differences in the sensitivity to injustice also exist in the eye of the victim.

The primary purpose of our study was to find indicators for a person's sensitivity to experienced injustice, and to investigate the correlational consistency among these indicators, i.e., to demonstrate their convergent validity. The four indicators we came up with were:
(1) Frequency of experienced injustice: If a person's threshold for perceiving unjust treatments by others is low, he or she should remember more such incidences than someone with a high threshold. Therefore, the reported frequency of experienced injustice should reflect the construct at issue.
(2) Intensity of anger following an unjust treatment: In Mikula's (1986) research, approximately two thirds of the subjects reported anger, rage, and indignation as predominant emotional reactions to being treated unfairly by others. Therefore, we assume that anger is a valid indicator for a person's sensitivity to experienced injustice.
(3) Intrusiveness of thoughts about the experienced injustice: We assume that the more a person thinks about and feels preoccupied with an unfair treatment, the more he or she attributes significance to this event.
(4) Desire to punish or rebuke the perceived perpetrator for his or her unjust behavior (punitivity): Both equity theory and just world theory assume that people have a desire for justice. People are motivated to reestablish justice if it has been violated. A direct way to reestablish justice if one has been treated unjustly is to punish or rebuke the perceived perpetrator. We assume that the tendency to do so depends on the degree of injustice which itself should be a function of a person's sensitivity to unjust treatment.

The second purpose of our study was to demonstrate the divergent validity of these indicators or measures for Sensitivity to Experienced Injustice (SEI) towards measures for related constructs, including Trait-Anger, Anger-In, and Anger-Out as anger expression modes, as well as Sensitivity (versus Tolerance) for Frustration.

The general methodology used to investigate both the convergent and discriminant validity of the indicators for SEI was structural equation modeling (cf. Bentler, 1980; Judd, Jessor, & Donovan, 1986). Various simple measurement models for the indicators of SEI as well as for the measures of the related constructs were specified as structural equation models and tested via LISREL (Jöreskog

& Sörbom, 1988). In order to estimate the correlations among the latent variables from different measurement models, i.e., from measurement models for different constructs, a simultaneous measurement model, including the simple models, was specified. Again, this model was tested and its parameters were estimated via LISREL.

METHOD

Questionnaires

Sensitivity to Experienced Injustice

The questionnaire consists of four scales measuring four hypothesized indicators for Sensitivity to Experienced Injustice (SEI), the Frequency of Experienced Injustice (FRE), the Intensity of Anger (INA), the Intrusiveness of Thoughts (INT), and Punitivity (PUN) as the tendency to punish or rebuke the perpetrator. 18 types of situations, e.g., performing better than others without getting any appreciation or reward, were developed, in which either the equity or the equality principle was violated resulting in an unfavorable outcome for the person. In the scale for assessing FRE (Frequency), the frequency of each of these 18 types of situations had to be estimated on six-point rating scales ranging from 1/seldom to 6/often. In the scale for the second indicator, INA (Intensity of Anger), the description of the same 18 situations was followed by a brief statement: "..., I get angry ...". Subjects had to rate on six-point rating scales (1/not at all ... 6/very much) how angry they would typically get in such a situation. In the scale for INT (Intrusiveness of Thoughts), the 18 situations were followed by five kinds of sentence completions, each stating that the person has to think about the incidence for quite a long time, e.g.: "..., I cannot forget about it for a long time". Subjects had to rate on six-point rating scales how much the statement was true for them (1/exactly true ... 6/completely false). For the last scale, PUN (Punitivity), eight of the 18 situations had to be eliminated because they could not be combined meaningfully with retaliatory actions. The remaining ten situations were followed by five kinds of sentence completions, each stating a retaliatory action, e.g.: "..., I want to pay them back for it." Again, subjects had to rate on six-point rating scales how well the statement described their behavioral intentions (1/exactly true ... 6/completely false). Before analyses, the scales INT and PUN were inverted, small values meaning, as for FRE and INA, little sensitivity to experienced injustice. The full wording of this questionnaire is given in the Appendix.

Situation-Emotion-Questionnaire

The questionnaire was developed to serve as a criterion for investigating the convergent and discriminant validity of the SEI-questionnaire described above. In the Situation-Emotion-Questionnaire, two kinds of situations are described, (1) ten situations where the person was treated unjustly by

someone else and (2) eight situations where the person was frustrated without being treated unfairly. Subjects were asked to rate on six-point rating scales (1/not at all ... 6/very much) for each of these 17 situations, (a) how angry and (b) how disappointed they would feel in each of the situations. Note that the situations were presented twice, i.e., each emotion had to be estimated in a separate administration of the situations. In contrast to the questionnaire for measuring SEI (see above), the situations in this questionnaire were not general types of situations but very specific occurences. Subjects were instructed to imagine the situation and to estimate the intensity of their anger and disappointment resulting from the situation. Consider an example for an unjust situation: "Imagine you are standing in line and someone pushes forward." This is an example for a frustrating situation: "Imagine you searching for your car keys. Suddenly you recognize that the keys are in your car and the door is closed." The full wording of this questionnaire is given in the Appendix.

Trait-Anger and Anger Expression-Scales

A German version (Schwenkmezger & Hodapp, 1989) of Spielberger's State-Trait-Anger-Expression-Inventory (Spielberger, 1988) was used to assess anger proneness as a stable disposition to react angrily as well as two kinds of expressing one's anger, i.e., extraverting (Anger-Out) and keeping it private (Anger-In). This questionnaire was included in order to test the discriminant validity of the Questionnaire for Sensitivity to Experienced Injustice and Situation-Emotion-Questionnaire.

Sample

The questionnaires described above were administered to a sample of 300 subjects, which were drawn randomly from the population of students and employees of the University of Trier, Germany. 218 subjects returned the questionnaires anonymously (69.3% females, 30.7% males; 90.1% students, 7,9% employees).

RESULTS

Separate Measurement Models

In the following sections, we will present various measurement models for the questionnaires described above. The models contain manifest and latent variables, are formulated as structural equation models, and will be tested with LISREL.

Measurement Model 1 (MM1): Sensitivity to Experienced Injustice

The first group of models pertains to the questionnaire for measuring sensitivity to experienced injustice (SEI). It consistes of four parts, each representing a different type of perception or reaction to unjust treatment:

(1) FRE: Frequency of experienced injustice.
(2) INA: Intensity of Anger following an unjust treatment.
(3) INT: Intrusiveness of and preoccupation with thoughts about the experienced injustice.
(4) PUN: Punitivity, i.e., the desire to punish or rebuke the perceived perpetrator for his or her unjust behavior.

Apriori Model

Even though these scales were developed to measure SEI (Sensitivity to Experienced Injustice) as a common latent trait, it is reasonable to assume that each scale measures a specific disposition in addition to SEI. First, the frequency of unjust experiences may not only indicate a person's sensitivity to experienced injustice; it may reflect in addition consistent individual differences in the number of objective instances of unjust treatment. For example, this objective frequency of unjust treatments may be a function of the professional position someone holds. Second, the intensitiy of anger following an unjust treatment may not only depend on an individual's sensitivity to injustice but also on his general anger proneness (Spielberger, 1988). Third, the intrusiveness or duration of thoughts about the experienced injustice may be part of a person's neuroticism (e.g., Eysenck, 1947). Fourth, the desire to punish the perceived perpetrator may not only reflect an individual's sensitivity to injustice but also her extrapunitivity (Rosenzweig, 1978).

In order to separate these specific traits from random measurement error, it was necessary to split the scales into test halves. This was done on the basis of results from preliminary exploratory factor analyses. The items were ordered according to the loadings on their common factor and divided into test halves with odd and even items on a separate test half, respectively. Consequently, a total of eight test halves (or observed variables or indicators) was available for testing different measurement models.

An ideal version of a model which represents the assumptions formulated above can be specified as follows:

(1) Each test half measures a common latent trait SEI (Sensitivity to Experienced Injustice).
(2) In addition, corresponding test halves measure a specific factor, e.g., Intensitiy of Anger about Experienced Injustice (INA), which is common to the corresponding test halves only.
(3) Corresponding halves measure the common trait (SEI) and their specific trait equally well.
(4) Corresponding test halves have equal reliabilities. Together with property (3), this implies that corresponding test halves are essentially τ-equivalent.

(5) The latent error variables represent only random measurement error or, if at all, systematic effects which are unique for each test half or indicator variable. This implies that all error variables are mutually uncorrelated, or, equivalently, that the eight indicator variables have no other factors in common than the common trait SEI and the four specific traits - which are common to corresponding test halves only (FRE, INA, INT, PUN).

The latent variable model which represents these ideal measurement properties is depicted schematically in Figure 1. There are five latent traits in the model: A latent trait common to all test halves (SEI), and one latent trait for each pair of test halves. All latent traits are mutually uncorrelated. The loadings accord to a perfect simple structure, i.e., each test half measures only SEI and its specific trait, e.g., FRE, but no other specific trait. Furthermore, all loadings are constrained to be equal pairwise. Finally, all error variables are uncorrelated, and their variances are constrained to be equal pairwise.

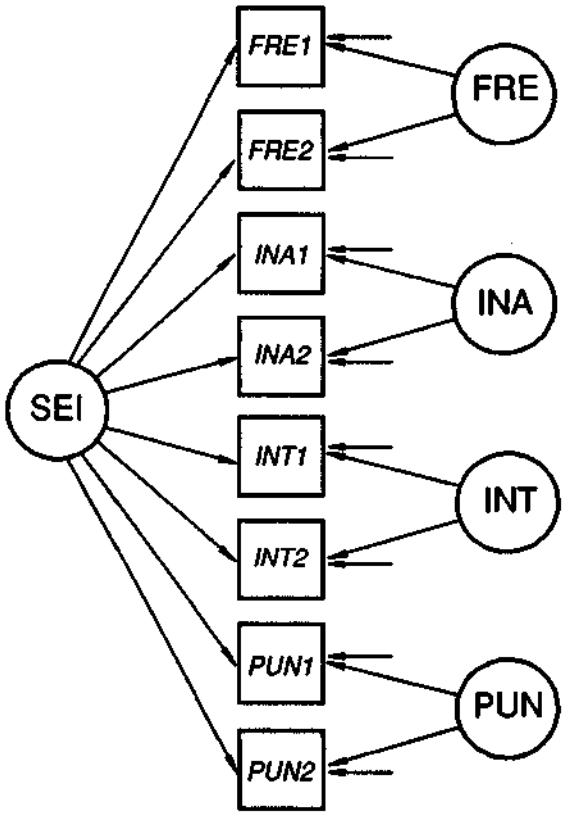

Figure 1: Apriori Measurement Model 1 (MM1)

The model implies an additive decomposition of each indicator variables into three independent latent variables: one common factor SEI, one specific factor (FRE, INA, INT, PUN), and random measurement error. It follows from the independence of these latent variables that their variances add up to the variance of the observed variables. Following the terminology of multitrait multime-

thod analysis (Widaman, 1985), SEI may be called the trait factor, whereas the specific factors may be interpreted as method factors.

The reader who is familiar with covariance structure analysis may note that because of the equality constraints on the loadings, the model in Figure 1 is equivalent with a second order factor model. SEI could as well be specified as a common second order factor accounting for the correlation among four first order factors. Note that the specific traits in Figure 1 would not be identical to the first order factors in such a model, however. Rather, they would correspond to the latent residuals (Zeta variables in LISREL) of the first order factors. This second order factor model is depicted schematically in Figure 2.

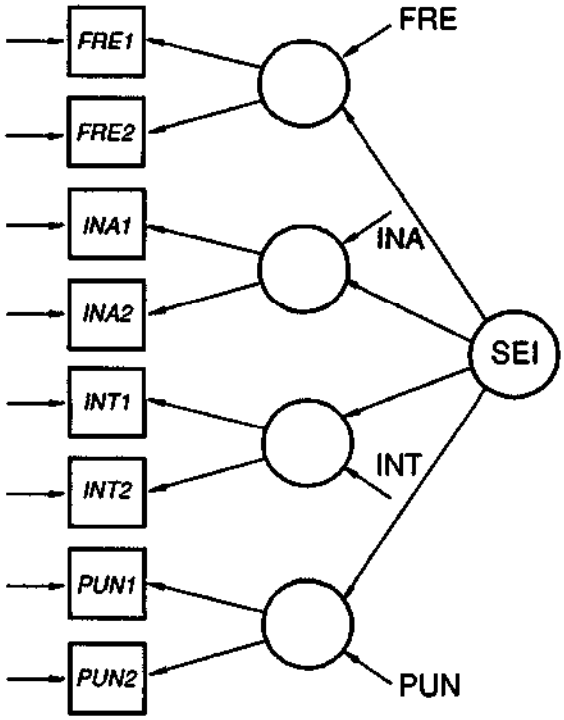

Figure 2: Second order factor model as an alternative to MM1 in Figure 1

The model in Figure 1 was tested via LISREL. Despite the rather restrictive specification of the model, its fit was excellent ($\chi^2_{24} = 17.17$; $p = .84$). The correlation matrix implied by the parameter estimates, given in Table 1, is almost identical to the empirical correlation matrix in the sample.

Two important conclusions can be drawn from the parameter estimates in Table 1:
(1) The estimated reliabilities of the scales are high: The error variances do not exceed .153, i.e., the reliabilities of the test halves amount to .84 or higher.

Table 1

Parameter Estimates for the Apriori MM1 from Figure 1

	Factor Loadings					Error
	SEI	FRE	INA	INT	PUN	Variances
FRE1	.45	.80	.00	.00	.00	.16
FRE2	.45	.80	.00	.00	.00	.16
INA1	.82	.00	.43	.00	.00	.14
INA2	.82	.00	.43	.00	.00	.14
INT1	.83	.00	.00	.46	.00	.10
INT2	.83	.00	.00	.46	.00	.10
PUN1	.65	.00	.00	.00	.64	.17
PUN2	.65	.00	.00	.00	.64	.17

Note. All parameter-values equal to zero are fixed values. Equal parameter values are constrained to be equal. Both manifest and latent variables are standardized, their variances being 1. The estimated reliabilities of the manifest variables are 1-error variance.

(2) The four scales do not measure SEI equally well. The intensity of anger following an unjust treatment and the intrusiveness of thoughts about such a treatment are much better indicators of the construct than the frequency of unjust experiences. Appearently, individual differences in the frequency of experienced injustice are only partly due to subjective interpretations. In addition, they seem to reflect substantial individual differences in the objective frequency of unjust treatments. These differences between individuals in the objective frequency of unjust treatments may stem from various sources, e.g., the jobs people have, the social positions they hold, the social roles they play, the family situation they live in, etc.

More Restrictive Alternative Models

The very good fit of the model suggests to consider even more restrictive models because they might also explain the empirical covariance structure sufficiently well. Therefore, four more parsimoneous models than the one described above were tested.

First, it was assumed that the four scales measure only specific traits but no common latent trait. This assumption implies that the four dispositions FRE, INA, INT, and PUN are mutually uncorrelated, i.e., sensitivity to experienced injustice does not exist as a disposition or at least cannot be measured with the four scales. The model that follows from this assumption differs from the model

depicted in Figure 1 in that all loadings of the eight test halves on SEI are zero. This model does not fit the data, however ($\chi^2_{28} = 302.38$; $p < .01$).

Second, it was assumed that the four scales measure only one common trait but no specific traits. This assumption implies that the eight test halves have only two sources of variance: The common latent trait SEI and random measurement error. The model that follows from this assumption differs from the apriori model in that all loadings of the indicator variables on the four specific traits FRE, INA, INT, and PUN are zero. Again, this model is unable to reconstruct the empirical correlation structure of the manifest variables ($\chi^2_{28} = 517.23$; $p < .01$).

Third, a model with one common factor (SEI) and one specific factor (FRE) was specified on the basis of the parameter estimates in Table 1. Given the pattern of loadings in Table 1, one could argue that the intensity of anger (INA), the duration of thoughts (INT), and the desire to retaliate (PUN) are indicative of a person's sensitivity to experienced injustice, whereas frequency (FRE) reflects only objective individual differences in the number of unjust experiences a person encounters. This model differs from the apriori model in that the loadings of *INA1* and *INA2* on INA, of *INT1* and *INT2* on INT, as well as of *PUN1* and *PUN2* on PUN are zero and that *FRE1* and *FRE2* have zero loadings on SEI. Again, this model does not fit the data ($\chi^2_{28} = 341.10$; $p < .01$).

Fourth, it was assumed that all test halves have equal reliabilities. This model differs from the apriori model in that the error variances for all manifest indicators were constrained to be equal. This model could not be rejected by the data ($\chi^2_{27} = 34.40$; $p = .16$), but its fit was significantly worse than the fit of the apriori model: The χ^2-difference between the two models is 17.23, a value which is significant with three degrees of freedom ($p < .001$).

Less Restrictive Alternative Models

In a second series of analyses, it was tested whether the fit of the apriori model could be improved by removing some of the restrictions that were imposed on the parameters.

First, the equality constraints for the error variances of corresponding test halves were removed, i.e., four more error variances were allowed to be estimated. This model fit the data very well ($\chi^2_{20} = 16.60$; $p = .68$), yet not significantly better than the apriori model ($\chi^2_4 = .57$; $p > .05$).

Second, the equality constraints for both the error variances of corresponding test halves and their loadings on the common latent trait SEI were removed, i.e., four more error variances and four more loadings were estimated. Again, this model fit the data very well ($\chi^2_{16} = 14.48$; $p = .56$), yet not significantly better than the apriori model ($\chi^2_8 = 2.69$, $p > .05$).

Third, the null model of the second order factor model, the latter one being equivalent to the apriori model (see above), was tested. This null model has four first order factors that correlate freely among each other (cf. Figure 3. The second order factor model is more restrictive than this null model because the effects of the second order factor on the first order factors impose restrictions on the correlations among the first order factors: In the second order factor model, there are four effects of the second order factor on the first order factors, whereas in the null model, six correlations among the first order factors can be estimated. The null model at issue fit the data barely better than the apriori model or the corresponding second order factor model ($\chi^2_{22} = 16.60$; $p = .79$). The difference between the two models is not significant ($\chi^2_2 = .57$; $p > .05$).

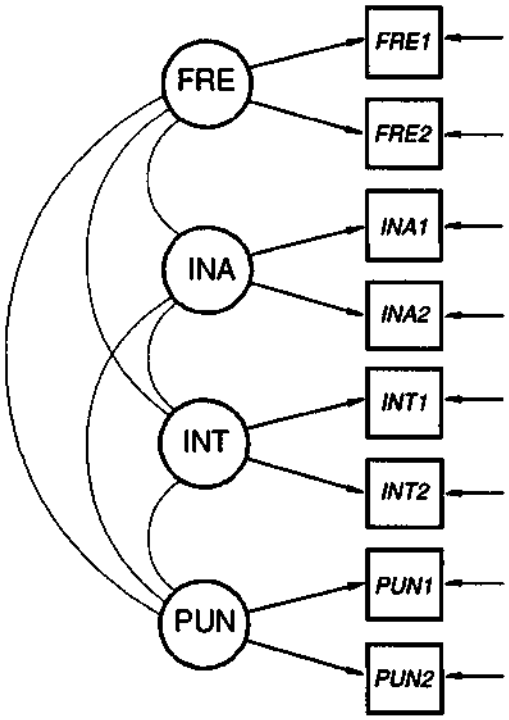

Figure 3: Null model for the second order factor model in Figure 2

To summarize, the apriori measurement model performed much better than any of the more restrictive models considered, and it did not fit the data significantly worse than any of the more liberal models. In fact, the χ^2/df ratio is even better for the apriori model than for any of the the less restrictive models. Furthermore, the difference between the Goodness of Fit Index (.98) and the Adjusted Goodness of Fit Index (.97) is lowest for the apriori model. This means that the apriori model is least likely to be rejected in crossvalidations. Consequently, the apriori model and the parameter estimates in Table 1 are accepted as the final model for the questionnaire "Sensitivity to Experienced Injustice".

Measurement Model 2 (MM2): Situation-Emotion-Questionnaire

We will now discuss measurement models for the Situation-Emotion-Questionnaire. In this questionnaire, two kinds of situations are described, (1) ten situations where the person was treated unjustly by someone else and (2) eight situations where the person was frustrated without being treated unfairly. Subjects were asked to rate (a) how angry and (b) how disappointed they would feel in each of the situations.

Apriori Model

It was assumed that the four groups of items that result from crossing the two dimensions "type of situation" and "type of emotion" measure the following four dispositions:

(1) The disposition to react angry, independent of the type of situation encountered (ANG).

(2) The disposition to react with disappointment, independent of the type of situation encountered (DIS).

(3) The disposition to be affected emotionally by frustrating events, independent of the kind of emotion. This disposition may be termed "Emotional Reactivity to Frustrating Events" (FRU).

(4) The disposition to be affected emotionally by unjust treatments, independent of the kind of emotion. This disposition may be called "Emotional Reactivity to Unjust Treatment" (INJ).

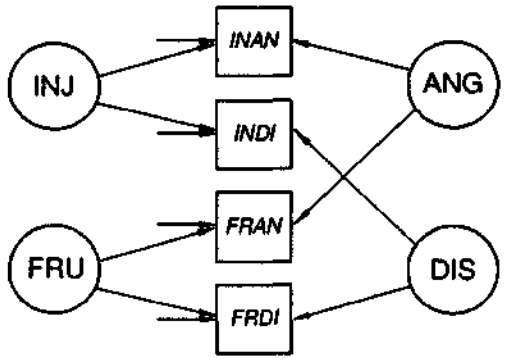

Figure 4: Apriori Measurement Model 2 (MM2)

The apriori model contains four latent variables representing the dispositions just mentioned. Note that each latent variable is measured by two scales that differ either in the type of situation or in the type of emotion they refer to (cf. Figure 4): The manifest variables are denoted *INAN* [Injustice (leads to) Anger], *INDI* [Injustice (leads to) Disappointment], *FRAN* [Frustration (leads to) Anger], *FRDI* [Frustration (leads to) Disappointment]. The reader who is familiar with structural equation modeling and confirmatory factor analysis might have noted that the structure of the apriori model corresponds to the general structure of multitrait multimethod models (Widaman, 1985). In the present application, types of situations and types of responses are crossed (instead of traits x methods). Since the format of the items remained the same across both, type of situation and type of emotion,

it is reasonable to expect that the four scales or indicator variables measure the two emotions (ANG, DIS) and the emotional reactivities towards two different types of situations (FRU, INJ) equally well, respectively.

It is less easy to justify assumptions concerning correlations among the four traits. A correlation between the emotional dispositions of anger and disappointment is likely, since both emotions imply that an expectation has been violated. However, it is also theoretically reasonable to assume that a person's emotional reactivity is generalized across different types of violated expectations. This would correspond to a correlation between FRU and INJ. Unfortunately, both assumptions cannot be tested simultaneously within the present measurement model, because only one of these two correlations can be identified in a set of structural equations. Furthermore, it cannot be decided on empirical grounds which of the two correlations constitues the right model, since both models are equivalent in explaining the empirical correlation structure among the four indicator variables. Hence, other criteria than empirical ones are needed for deciding this issue. Given this situation, it seems most reasonable to constrain the two correlations at issue to be equal.

Table 2

Parameter Estimates for the Apriori MM2 from Figure 4

	Factor Loadings				
	INJ	FRU	ANG	DIS	Error Variances
INAN	.42	.00	.77	.00	.23
INDI	.42	.00	.00	.77	.23
FRAN	.00	.42	.77	.00	.23
FRDI	.00	.42	.00	.77	.23
	Factor Correlations				
FRU	.47				
ANG	.00	.00			
DIS	.00	.00	.47		

Note. All parameter-values equal to zero are fixed values. Equal parameter values are constrained to be equal. Both manifest and latent variables are standardized, their variances being 1. The estimated reliabilities of the manifest variables are 1-error variance.

The apriori model was tested via LISREL. The model can be accepted ($\chi^2_6 = 9.95$; p =.13) despite its restrictive equality constraints on the loadings and error variances. All loadings of ANG and DIS on the four manifest indicator variables were constrained to be equal. The same is true for the loadings of INJ and FRU. Furthermore, the error variances of all four indicator variables were set to be equal. The maximum likelihood parameter estimates for the model are given in Table 2.

More Restrictive Alternative Model

In a first aposteriori analysis, all latent variables (INJ, FRU, ANG, DIS) were constrained to be orthogonal. This additional restriction depressed the fit of the model substantially ($\chi^2_7 = 43.90$; $p < .01$). The difference between this model and the apriori model is significant ($\chi^2_1 = 33.95$; $p < .01$).

The second more restrictive model was a one factor model assuming that all four indicator variables share only one source of systematic variance and have uncorrelated residual or error variables. The common factor of the four indicators might be called "Emotional Reactivity to Unjust and Frustrating Situations". In a first analysis, it was assumed that all four loadings and all four error variances are equal, respectively. This model had to be rejected ($\chi^2_8 = 85.54$; $p < .01$). In a second analysis, the equality constraints on loadings and error variances were removed. Nonetheless, the fit of this more liberal congeneric model remainded unacceptable ($\chi^2_2 = 79.01$; $P < .01$).

In a third series of analyses, various two factor models were specified and tested. As an alternative to the four factor apriori model, one might assume two factor models in which either (a) the two types of situations or (b) the two types of emotional reactions load on separate, yet correlated factors, respectively. In the first case, the two factors might be called "Emotional Reactivity to Unjust Situations" and "Emotional Reactivity to Frustrating Events", in the second case, the two factors might be called "Anger In Unjust and Frustrating Situations" and "Disappointment in Unjust and Frustrating Situations". Three versions of these two factor models were tested: (a) Models with equal loadings and equal error variances, (b) models with pairwise equal loadings and pairwise equal error variances, and (c) models with unequal loadings and unequal error variances. None of these models fitted the data adequately. The model with the best χ^2/df ratio still had a χ^2-value of 53.12 with 7 degrees of freedom ($p < .01$).

Less Restrictive Alternative Models

First, it was tested whether the fit of the model can be improved by removing some or all of the equality constraints that were imposed on the loadings and error variances in the apriori model. None of these modifications lead to a significant improvement of the model fit. Although the χ^2-values for these models were (slightly) lower than the χ^2-value for the apriori model, the p-values for the more liberal models were lower due to the loss of degrees of freedom.

Second, the apriori model was modified in a stepwise manner according to the modification indices computed by LISREL. A model was found which fit the data significantly better than the apriori model ($\chi^2_2 = .97$; $p = .62$). Even though this model was superior to the apriori model, it was rejected for two reasons. First, the model had a theoretically nonsensical loading of the indicator variable *FRAN* [Frustration (leads) to Anger] on the factor DIS. Second, corresponding loadings in the model were unequal. This implies that the model is much less parsimoneous than the apriori model (2 versus 6 degrees of freedom for the model test). It is thus very likely that the model was overfitted and would not hold in an independent replication.

To summarize, the apriori model fit the data better than all but one of the alternative models. The model who had a better fit was not accepted because it (a) contained a theoretically nonsensical parameter, (b) was found in an exploratory stepwise fitting procedure, and (c) was much less parsimoneous than the apriori model. Consequently, the apriori model was accepted.

Measurement Model 3 (MM3): Trait-Anger and Anger Expression

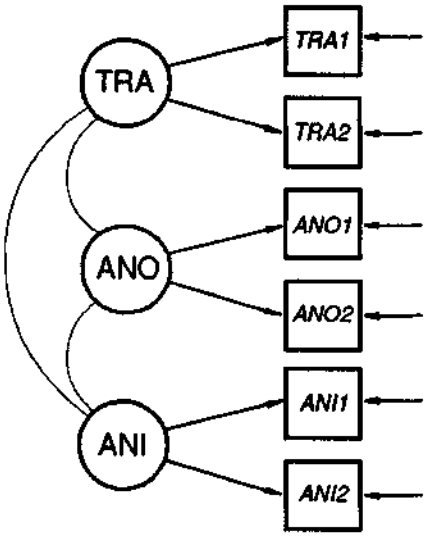

Figure 5: Apriori Measurement Model 3 (MM3)

We will now describe measurement models for the German version (Schwenkmezger & Hodapp, 1989) of Spielberger's State-Trait-Anger-Expression-Inventory (Spielberger, 1988). Our analyses pertain to Trait-Anger (TRA) and two of the three anger expression modes, Anger-In (ANI) and

Anger-Out (ANO). The scales for measuring TRA, ANI, and ANO were split into halves. This was done in the same way as for the scales measuring Sensitivity to Experienced Injustice (see above).

Apriori Model

The apriori measurement model (Figure 5) was a common factor model with the following properties: (1) The factor loading matrix has perfect simple structure, i.e., corresponding test halves measure only their common factor and have zero loadings on the remaining factors. (2) The test halves are τ-equivalent. This means that the test halves measure their common factor equally well, i.e., their loadings on their common factor are constrained to be equal, and the variances of their measurement error variables are constrained to be equal, as well. (3) All measurement error variables are mutually uncorrelated. (4) Correlations among the factors may exist. This model was tested via LISREL. The correlation matrix implied by the model did not significantly differ from the empirical correlation matrix of the six test halves ($\chi^2_{12} = 19.46$; $p = .078$).

Table 3

Parameter Estimates for the Accepted MM3

	Factor Loadings			
	TRA	ANO	ANI	Error Variances
TRA1	.85	.00	.00	.28
TRA2	.85	.00	.00	.28
ANO1	.00	.81	.00	.34
ANO2	.00	.81	.00	.34
ANI1	.00	.00	.92	.15
ANI2	.00	.00	.92	.15
	Factor Correlations			
ANO	.80			
ANI	.00[b]	-.33		

Note. Correlation between TRA and ANI not significantly different from zero. All zero-loading are fixed values. Equal parameter values are constrained to be equal. Both manifest and latent variables are standardized, their variances being 1. The estimated reliabilities of the manifest variables are 1-error variance.

More Restrictive Models

The correlation between the factors was estimated as follows: COR(TRA,ANI) = .07; COR(TRA,ANO) = .79; COR(ANI,ANO) = -.29. Thus, while the correlation between Trait-Anger and Anger-In was close to zero, Trait-Anger and Anger-Out were highly correlated. This has been found in other studies as well (e.g., Schmitt, Hoser, & Schwenkmezger, 1991). The correlation between the two anger expression modes was negative but not very high.

In a first aposteriori analysis, it was tested whether fixing the correlation between Trait-Anger and Anger-In to be zero would decrease the fit of the model significantly. This was not the case (χ^2_{13} = 20.27; p = .089). In a second analysis, it was tested whether the correlation between Trait-Anger and Anger-Out is significantly different from 1. This restriction lead to an unacceptable model fit (χ^2_{14} = 45.72; p < .01).

For reasons of parsimony, the model with a zero correlation between Trait-Anger and Anger-In was accepted as the final model. In this model, the correlation between Trait-Anger and Anger-Out was estimated to be .80, whereas the correlation between the opposing anger expression modes was estimated to be -.33. All parameter estimates are given in Table 3.

Simultaneous Measurement Models

So far, we have shown that our theoretical measurement models are consistent with our sample data. This is an important but of course not a sufficient step towards construct validation. Construct validation must go beyond modeling the internal structure of measurement instruments. Additionally, it requires that relations with outside criteria, predicted on theoretical grounds, can be demonstrated. For example, the measurement instrument at issue should correlate highly with other measures of the same construct (convergent validity), and it should not correlate with instruments of other, theoretically unrelated constructs (discriminant validity).

In order to investigate the convergent and discriminant validity of our measures for Sensitivity to Experienced Injustice, the three measurement models described above were combined into a simultaneous measurement model. Such a simultaneous measurement model is necessary and adequate for estimating the correlations among the latent variables. In order to retain the meaning of the latent variables from the separate measurement models, it is necessary to include the parameter estimates from these models as fixed parameters into the simultaneous model.

Hypotheses

Preliminary Remarks

Measurement Model 1 contains five factors (Figure 1). SEI (Sensitivity to Experienced Injustice) reflects individual differences which are common to all eight indicators. Phrased in the terminology of multitrait multimethod models, SEI is the common trait factor. By contrast, the four remaining factors FRE (Frequency), INA (Intensitiy of Anger), INT (Intrusiveness), and PUN (Punitivity) are residual or specific or, phrased in multitrait multimethod terminology, method factors. By definition, they are independent from SEI, i.e., they do not measure Sensitivity to Experienced Injustice but specific components of the four types of indicators. For example, INA should reflect individual differences in the intensity of anger which are not due to a persons sensitivity to experienced injustice but to his or her anger proneness in such situations or, which is open to question, his or her more general anger proneness.

Measurement Model 2 may also be interpreted as a multitrait multimethod model (Figure 4). It contains the two trait factors INJ (Emotional Reactivity to Unjust Treatment) and FRU (Emotional Reactivity to Frustrating Events). By definition, they are independent from the two emotion or method factors DIS (Disappointment) and ANG (Anger), which reflect individual differences in these emotions that are common for both, unjust and frustrating situations.

Measurement Model 3 (Trait-Anger and Anger Expression, Figure 5) differs from the preceding models in that each observed variable is caused by one common trait factor only [TRA Trait-Anger), ANO (Anger-Out), ANI (Anger-In)], i.e., trait variance and method variance are confounded in this model.

Expected Correlations of the Trait Factor from MM1 with the Trait Factors from MM2

If the common trait factor SEI in Measurement Model 1 (MM1) indeed reflects individual differences in sensitivity to experienced injustice as a latent disposition, it should correlate higher with the common trait factor INJ (Emotional Reactivity to Unjust Treatments) than with the common trait factor FRU (Emotional Reactivity to Frustrating Events), both from Measurement Model 2 (MM2).

Expected Correlations of the Trait Factor from MM1 with the Method Factors from MM2

Since SEI (Sensitivity to Experienced Injustice) does not contain any specific or method variance of the four types of indicators, such as intensity of anger, it should also not correlate with the two emotion or method factors ANG (Anger) and DIS (Disappointment) in MM2.

Expected Correlations of the Trait Factor from MM1 with the Factors from MM3

For the same reason, SEI should not correlate with the three anger factors TRA (Trait-Anger), ANO (Anger-Out), and ANI (Anger-In) in MM3. This follows directly from the specification of MM1.

Reacting angry towards an unjust treatment is considered in this model to be an additive function of two independent latent dispositions, (1) a person's sensitivity to experienced injustice and (2) his or her anger proneness in such situations or, which is open to question, his or her more general anger proneness.

Expected Correlations of the Method Factors from MM1 with the Trait Factors from MM2

The hypotheses formulated so far imply that the method factors FRE (Frequency), INA (Intensity of Anger), INT (Intrusiveness), and PUN (Punitivity) from MM1 should not correlate with the trait factors FRU (Emotional Reactivity to Frustrating Events) and INJ (Emotional Reactivity to Unjust Treatments) from MM2.

Expected Correlations of the Method Factors from MM1 with the Method Factors from MM2

Method factor INA (Intensity of Anger) from MM1 should correlate highly with method factor ANG (Anger) from MM2 but less highly with DIS (Disappointment). It follows from this assumption and from the mutual independence of the method factors in MM1, that ANG (Anger, MM2) should be uncorrelated with all method factors from MM1 (FRE, INT, PUN) except, of course, INA. In fact, this would be a trivial implication if the correlation between the two method factors INA (MM1) and ANG (MM2) was 1. Furthermore, since the method factors ANG and DIS in MM2 are only moderately correlated, DIS may correlate with each of the method factors from MM1.

Expected Correlations of the Method Factors from MM1 with the Factors from MM3

From the method factors of MM1, INA (Intensity of Anger) is expected to correlate with TRA (Trait-Anger) and the two anger expression factors ANO (Anger-Out) and ANI (Anger-In) from MM3. The method factor PUN, reflecting the desire to punish or rebuke the perpetrator, should correlate positively with Trait-Anger and Anger-Out, but not or even negatively with Anger-In. This is the case because Anger-In denotes the tendency to hold back one's anger as opposed to expressing it overtly. Finally, INT (Intrusiveness of Thoughts) is expected to correlate more highly with Anger-In than with Anger-Out. Keeping one's anger private (versus expressing it openly) should lead to a slower decrease in one's emotional arousal and to a longer mental preoccupation with the causes of one's anger.

Expected Correlations of the Trait Factors from MM2 with the Factors from MM3

Since by definition, the two trait factors INJ (Emotional Reactivity to Unjust Treatments) and FRU (Emotional Reactivity to Frustrating Events) from MM2 are free from specific anger variance, they should not correlate with the anger factors from MM3.

Expected Correlations of the Method Factors from MM2 with the Factors from MM3

The emotion or method factor ANG (Anger) from MM2 should correlate higher than DIS (Disappointment) with the anger factors from MM3. Figure 6 shows the basic structure of the

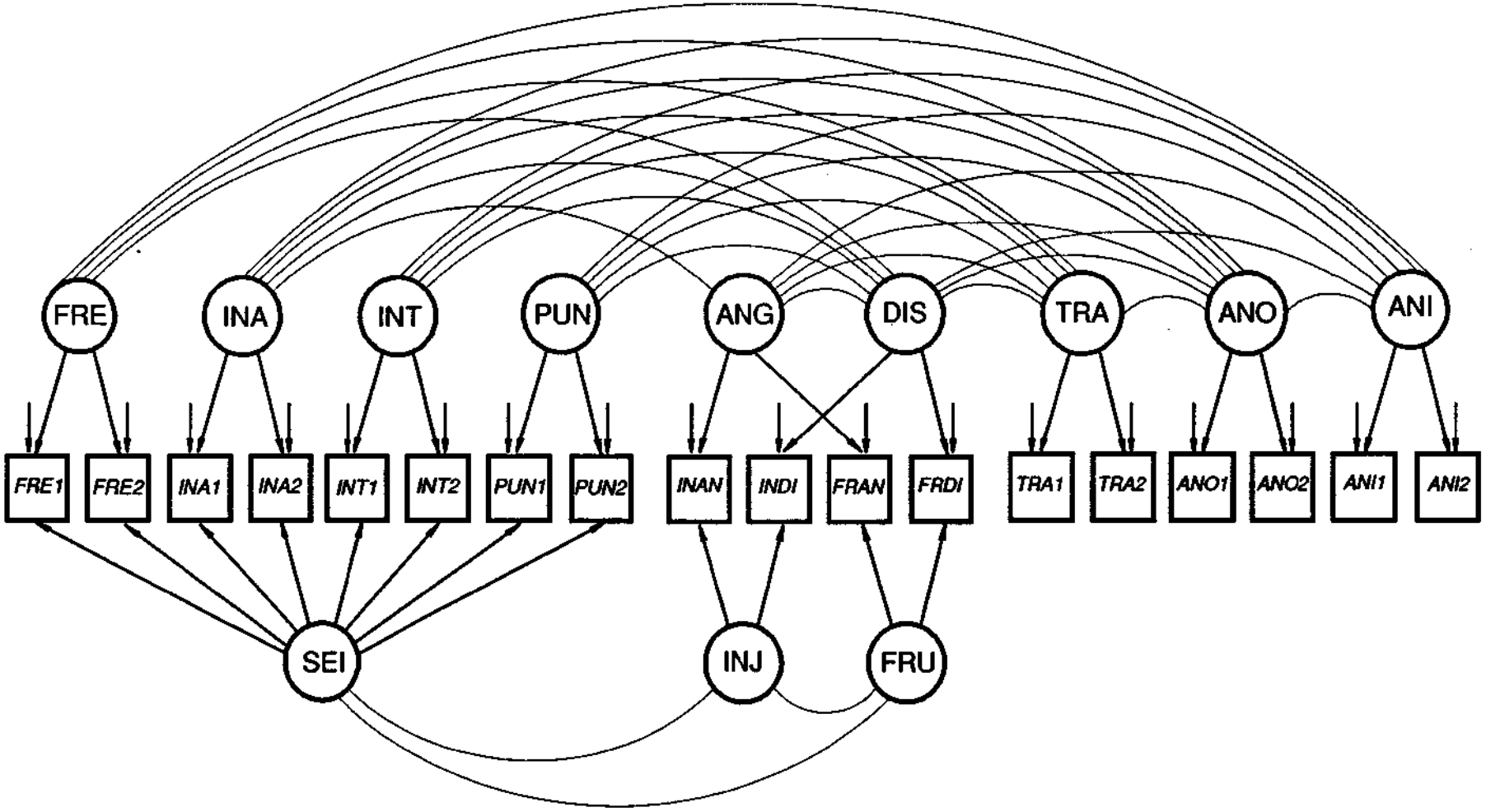

Figure 6: Apriori Simultaneous Measurement Model

simultaneous measurement model, including expected non-zero correlations (latent variables connected by arcs) and expected zero-correlations (no connection between latent variables).

The Problem of Identification

Testing the hypotheses formulated in the last section requires to estimate all possible correlations among all factors across the three measurement models. Unfortunately, this is not possible, because not all of these correlations can be identified simultaneously from the set of structural equations. This is true although the simultaneous model contains the parameter estimates for the factor loadings, the correlations among the factors within the separate measurement models, and the error variances as fixed parameters.

Consider the following example: The correlation between any of the indicator variables from MM1 with any of the indicator variables from MM2 can be explained by four correlations among latent variables from these measurement models: (1) the correlation between the trait factor SEI from MM1 with trait factors INJ and FRU from MM2, (2) the correlation between the trait factor SEI from MM1 with method factors ANG and DIS from MM2, (3) the correlation between the method factors FRE, INA, INT, and PUN from MM1 with trait factors INJ and FRU from MM2, and (4) the correlation between the method factors FRE, INA, INT, and PUN from MM1 with the method factors ANG and DIS from MM2.

In order to estimate some of the correlations among the factors across the measurement models, restrictive assumptions have to be introduced. It is not possible to simultaneously estimate certain parameters and to test the assumptions that have been formulated to identify them. If the model does not fit, however, this means that at least some of the assumptions are false. On the other hand, a good fit of the model does not prove that the assumptions are right. It only means that the model is one among perhaps many models, containing different assumptions and parameter estimates, that may all be consistent with the data, i.e., that may be able to explain the correlations among the observed variables equally well. This is a well known problem in structural equations modeling (cf. e.g., Judd et al., 1986; Tanaka, Panter, Winborne, & Huba, 1990), pointing out the crucial role of theory in specifying structural equation models.

Note that this problem is not a special problem of structural equation modeling, however. In conventional correlational analyses, only measurement variables are considered, for example two scales supposedly measuring two personality traits. If a correlation between the scale scores is found, it is usually interpreted as a correlation of the traits, i.e., a correlation of the true score variables. However, this interpretation rests on the assumption that the two measurement errors are strictly random and uncorrelated. Yet it may well be that the correlation of the scale scores is partly or even entirely due to correlated measurement error.

Assumptions

In order to solve the identification problem described above, several restrictive assumptions have to be introduced in addition to the assumptions already contained in the simple measurement models. First, all hypotheses stating zero correlations between latent variables (from different measurement models) were introduced as assumptions. For example, the correlations of SEI (MM1) with TRA, ANI, and ANO (MM3) were assumed to be zero (cf. Figure 6). Yet these assumptions would still not suffice to identify all remaining correlations between the latent variables from MM1 and MM2. For instance, the correlation between the manifest variables from MM1 and the manifest variables from MM2 could still be explained by correlations among the method factors and by correlations among the trait factors from these models. Therefore, the following two equality constraints were introduced: First, it was assumed that the correlation of FRU (Emotional Reactivity to Frustrating Events, MM2) with the two sensitivity to injustice factors, SEI (Sensitivity to Experienced Injustice, MM1) and INJ (Emotional Reactivity to Unjust Treatments, MM2), are equal to each other. This equality constraint is reasonable under the assumption that SEI and INJ are highly similar or even identical constructs. Second, it was assumed that the correlation of DIS (Disappointment, MM2) with the two anger method factors, INA (Intensitiy of Anger, MM1) and ANG (Anger, MM2), are equal to each other. Again, this assumption is reasonable if the two anger method factors from MM1 and MM2, respectively, represent identical or highly similar dispositions.

The constraints stated so far can be summarized together with the parameters to be estimated in a LISREL type (mixed) pattern and value matrix (Table 4). Three kinds of numbers appear in this matrix. (1) The term ".00[a]" symbolizes fixed zero correlations among latent variables within the simple measurement models. These restrictions were adopted from the accepted simple measurement models. (2) Furthermore, Table 4 contains two fixed nonzero correlations among latent variables from MM3, i.e., a fixed correlation of .80 between TRA (Trait-Anger) and ANO (Anger-Out) as well as a fixed correlation of -.33 between ANO and ANI (Anger-In). Both values were estimated in the separate analyses for MM3. (3) Finally, the consecutive natural numbers from 1 to 25 refer to correlation parameters which are free to be estimated. Note that the numbers 2 and 5 appear twice because the corresponding parameters were constrained to be equal.

The simultaneous measurement model to be tested is partly specified by the pattern and value matrix from Table 4. The remaining parameters (loadings, error variances) were adopted from the accepted simple measurement models. Note that all error variables are mutually uncorrelated, both within and across the simple measurement models.

Table 4

Fixed correlations and correlations to be estimated (symbolized by consecutive natural numbers) among the latent variables of the simultaneous measurement model

	MM1	MM1	MM1	MM1	MM1	MM2	MM2	MM2	MM2	MM3	MM3
	SEI	FRE	INA	INT	PUN	INJ	FRU	ANG	DIS	TRA	ANO
FRE	.00[a]										
INA	.00[a]	.00[a]									
INT	.00[a]	.00[a]	.00[a]								
PUN	.00[a]	.00[a]	.00[a]	.00[a]							
INJ	1	.00	.00	.00	.00						
FRU	2	.00	.00	.00	.00	2					
ANG	.00	.00	3	.00	.00	.00[a]	.00[a]				
DIS	.00	4	5	6	7	.00[a]	.00[a]	5			
TRA	.00	8	9	10	11	.00	.00	12	13		
ANO	.00	14	15	16	17	.00	.00	18	19	.80[a]	
ANI	.00	20	21	22	23	.00	.00	24	25	.00[a]	-.33[a]

Note. [a] Restriction adopted from the simple measurement models.

Model Tests and Parameter Estimates

Apriori model

The simultaneous measurement model described in the preceeding section was submitted to a LISREL analysis. The χ^2-value for the model was 182.21. Given 146 degrees of freedom, its p-value is .023. However, these values should be interpreted cautiously. A χ^2 goodness of fit test in a strict sense is not possible for this model because some of the fixed parameters were estimates from previous LISREL analyses of the simple measurement models. Despite this restriction, the model fit seems acceptable for the following reasons: First, the descriptive LISREL Goodness of Fit Index is .91. Second, the LISREL Ajusted Goodness of Fit Index is only slightly lower (.89). This means that very similar parameter values would be estimated from an independent sample drawn from the same population, or, respectively, that the model would fit almost equally well in independent cross validation samples from the same population. Third, the empirical correlation matrix and the theoretical correlation matrix implied by the model are highly similar, even though they differ significantly: Only two out of 171 normalized residuals are larger than $|2|$. This is less than would be expected by chance in a random sample from the population for which the model is true.

More restrictive model

Three out of the 25 estimated correlations among the latent variables did not significantly differ from zero. Therefore, these parameters were fixed to be zero in a second analysis. These restrictions lead to slight but insignificant decrease in the model fit ($\chi^2_{149} = 183.27$). In fact, the p-value for the more restrictive model was even slightly better (p = .029) than the p-value for the apriori model (p = .023). Consequently, the more restrictive model was preferred. The correlations between the latent variables in this model are given in Table 5.

Table 5

Estimates correlations among latent variables for the accepted simultaneous measurement model

	MM1	MM1	MM1	MM1	MM1	MM2	MM2	MM2	MM2	MM3	MM3
	SEI	FRE	INA	INT	PUN	INJ	FRU	ANG	DIS	TRA	ANO
FRE	.00[a]										
INA	.00[a]	.00[a]									
INT	.00[a]	.00[a]	.00[a]								
PUN	.00[a]	.00[a]	.00[a]	.00[a]							
INJ	.81	.00[d]	.00[d]	.00[d]	.00						
FRU	.59[c]	.00[d]	.00[d]	.00[d]	.00[d]	.59[c]					
ANG	.00[d]	.00[d]	.61	.00[d]	.00[d]	.00[a]	.00[a]				
DIS	.00[d]	.15	.33[c]	.28	.00[b]	.00[a]	.00[a]	.33[c]			
TRA	.00[d]	.47	.89	.76	.74	.00[d]	.00[d]	.50	.42		
ANO	.00[d]	.22	.47	.47	.58	.00[d]	.00[d]	.22	.13	.80[a]	
ANI	.00[d]	.43	.17	.24	.00[b]	.00[d]	.00[d]	.00[b]	.45	.00[a]	-.33[a]

Note. [a] Restriction adopted from the simple measurement models.

[b] Not significantly different from zero.

[c] Equality contraint for identifying the model.

[d] Constraint for identifying the model, based on theoretical or logical grounds.

Before we compare the correlations in Table 5 with our hypotheses, two more analyses need to be reported. In the first anlysis, it was tested whether the correlation of .81 between SEI (Sensitivity to Experienced Injustice, MM1) and INJ (Emotional Reactivity to Unjust Treatment) differs significantly from the correlation of .59 between SEI and FRU (Emotional Reactivity to Frustrating Events). This test is crucial for the discriminant validity of the measures for Sensitivity to Ex-

perienced Injustice vis à vis measures for a related disposition, Sensitivity to Experienced Frustration. The question at issue can be investigated by testing a model in which the two correlations are constrained to be equal. The χ^2-value for this model was 192.72 (df = 150, p = .011). Compared to the χ^2-value for the previous model (183.27), this increase is highly significant for one degree of freedom. It can be concluded, therefore, that the correlation between SEI and INJ is significantly higher than the correlation between SEI and FRU.

In the second aposteriori analysis, it was tested whether the correlation between SEI and INJ differs significantly from 1. If this were not the case, the two latent variables SEI and INJ could not only be considered as highly similar, but as identical dispositions. This would be desirable from a theoretical point of view, but for the following reasons, it is not necessary for maintaining the construct of Sensitivity to Experienced Injustice: The questionnaire items for measuring SEI and INJ refer to different situations, and a person's sensitivity to experienced injustice may not be generalized perfectly across these (and related) situations. Although SEI and INJ are free from some specific sources of variance (cf. the description of the simple measurement models), they are certainly not free from all specific effects. For example, they may still contain a small proportion of systematic variance due to the specific situations chosen for the items of the two questionnaires measuring SEI and INJ.

Fixing the correlation between SEI and INJ to 1 lead to a significant decrease in the model fit. The χ^2-value was 196.11 (df = 150, p = .007) compared to 183.27 for the less restrictive model. This difference is significant for one degree of freedom. Therefore, it can be concluded that the correlation between SEI and INJ is different from 1.

Given the results from the last two analyses, the model described in Table 5 was accepted as the final simultaneous measurement model. In the next section, we will discuss the parameter estimates for this model (Table 5) and compare them to the hypotheses formulated earlier.

Discussion of the Accepted Model

Correlations of the Trait Factor from MM1 with the Trait Factors of MM2

In line with our expectations, the trait factor SEI (Sensitivity to Experienced Injustice) correlates more highly with the trait factor INJ (Emotional Reactivity to Unjust Treatments) than with the trait factor FRU (Emotional Reactivity to Frustrating Events). However, the pattern of correlations among these three latent variables needs further consideration.

First, the correlations between SEI and FRU as well as between INJ and FRU are significant and substantial (.59). Obviously, a person's sensitivity to experienced injustice is not independent from his or her sensitivity to frustrations. As was discussed in relation with possible specifications of

MM2, this is quite plausible psychologically because injustice and frustration both imply that an expectation has been violated. Yet it does make a difference whether this expectation relies on normative values (injustice) or not (mere frustration). Perhaps, however, the high correlation between Sensitivity to Experienced Injustice and Sensitivity to Frustrations is due to the fact that "mere" frustrations may be rare and that most frustrating events can be looked upon from a normative perspective, also. Consider, for example, the situation in which a paper bag breaks and its content falls down. Possibly, at least some individuals attribute responsibility for this frustrating event to agents, e.g., the supermarket (they should give you stronger paper bags!) or to the paper bag maker (they should make better paper bags!) and perhaps feel exploited (treated unjustly!). Similar perceptional and interpretational ambiguities may hold for other situations used in our Situation-Emotion-Questionnaire (cf. Appendix).

The second issue has also been adressed already: The correlation between SEI (Sensitivity to Experienced Injustice) and INJ (Emotional Reactivity to Unjust Treatments) is not perfect but .81 only. That is, the latent variables SEI and INJ are not identical. Probably, this reflects that individuals' disposition to be affected by unjust treatment varies across different situations. This interpretation seems reasonable because our questionnaires for measuring SEI and INJ contained different situations, and because all behavioral and emotional dispositions, which have been investigated in this regard, are (more or less) situationally specific (Steyer, Gräser, & Widaman, in press).

Correlations of the Method Factors from MM1 with the Method Factors from MM2

As expected, the correlation between the two anger method factors INA (Intensity of Anger, MM1) and ANG (Anger, MM2) is substantial (.61) and higher than the correlation between the anger method factor INA in MM1 and the disappointment method factor DIS in MM2. The remaining correlations between the method factor disappointment (DIS) in MM2 and the method factors in MM1 were either small [FRE (Frequency), INT (Intrusiveness)] or even not significantly different from zero [PUN (Punitivity)].

Correlations of the Method Factors from MM1 with the Factors from MM3

We had expected that from the method factors in MM1, INA (Intensitiy of Anger) should be correlated with TRA (Trait-Anger) and the two anger expression factors ANO (Anger-Out) and ANI (Anger-In) from MM3. Furthermore, the method factor PUN (Punitivity, MM1), reflecting the desire to punish or rebuke the perpetrator, was hypothesized to correlate with Trait-Anger and Anger-Out, but not or even negatively with Anger-In (MM3). Finally, INT (Intrusiveness, MM1) was expected to correlate more highly with Anger-In than with Anger-Out (MM3).

The parameter estimates in Table 5 correspond only partly with these hypotheses. As expected, TRA correlates highly with INA and with PUN, but it also correlates highly with INT. It seems that anger prone individuals are more inclined to ruminate about unjust treatments than individuals with

low trait-anger levels. Also, TRA correlates substantially with FRE (Frequency, MM1). This correlation contradicts our assumption that FRE reflects only the objective frequency of unjust treatments but not a person's subjective sensitivity to injustice. The latter may lower a persons perceptual threshold for injust events and thus lead to a larger number of such events. Since FRE is a residual or method factor, it should be free from this subjective component. On the other hand, one might speculate that the correlation between FRE and TRA reflects a causal effect. A person's anger proneness may increase over time as a function of the frequency of unjust treatments. Yet this reasoning would imply either a correlation between FRE and INA or a correlation between FRE and SEI. If someone is objectively beeing treated injustly very often, this should increase either his tendency to react angry in such situations (INA) or increase his susceptibility to injustice (SEI). Both correlations were set equal to zero, however.

The pattern of correlations between the anger expression factors ANO (Anger-Out) and ANI (Anger-In) corresponds to our expectations. Specifically, ANO correlates substantially with PUN (punitivity, MM1), whereas the correlation between PUN and ANI is not significantly different from zero.

Correlations of the Method Factors from MM2 with the Factors from MM3

It was expected that the method factor ANG (Anger) from MM2 should correlate more highly than DIS (Disappointment) with the anger factors from MM3. The pattern of correlations in Table 5 corresponds only partly with these assumptions. As expected, TRA (Trait-Anger) and ANO (Anger-Out) correlate more highly with method factor ANG than with method factor DIS, although the differences are small. Contrary to our expectations, the correlation between DIS and ANI is higher than the correlation between ANG and ANI. Perhaps, this correlation is spurious, reflecting as a common source of variance a personal norm of nonaggression. Disappointment is a nonaggressive way of communicating to someone that he or she has violated an expectation, whereas Anger-In reflects the disposition to not say or show one's emotional reaction to violated expectations at all.

SUMMARY AND GENERAL DISCUSSION

The purpose of this study was to investigate empirically a new justice construct, Sensitivity to Experienced Injustice as a personality trait. A questionnaire for measuring individual differences in this trait was developed (Appendix). It consists of four scales, each containing items which refer to the same 18 types of situations. These types or classes are abstract (e.g., performing better than someone else without getting credit) and may include a large number of specific, yet functionally equivalent, situations. The first scale, frequency of experienced injustice, may be considered a perceptual threshold measure. The person is asked to indicate how often he or she has encountered the type of situation. The remaining three scales measure different forms of reacting towards an unjust

treatment, (a) the intensity of anger following such an event, (b) the duration of mental preoccupation with the event, and (c) the desire to rebuke or punish the perpetrator for his unfair behavior.

In order to validate this questionnaire, two other questionnaires were included in the study. The Situation-Emotion-Questionnaire consists of two kinds of concrete and specific situations: (a) situations in which the person was treated unjustly (standing in a line and being passed by another person) and (b) situations in which the person was merely frustrated but not treated unjustly (locking in one's car key). For each situation, the person has to rate how much he or she would be (a) angry and (b) disappointed.

Finally, a German version of Spielberger's (1988) State-Trait-Anger-Expression-Inventory (Schwenkmezger & Hodapp, 1989) was administered to the subjects.

Whereas in traditional convergent and discriminant construct validation, correlations among scale scores (measurement variables) are compared, we used structural equation modeling with latent variables for the same purpose. An apriori measurement model was specified for each of the three questionnaires and tested against competing models. In a second step, the accepted simple measurement models were combined into a simultaneous measurement model in order to estimate the correlation among the latent variables representing the constructs which were measured by the questionnaires.

The advantage of this latent variables approach is threefold. First, these models take care of the problem of measurement error. In conventional analyses, the correlations among scales scores are attenuated by unreliability of measurement. In latent variable models, the correlations at issue are estimated on the level of error-free latent variables.

A second advantage of using latent variables modeling for construct validation is that these models are theory-driven confirmatory models which can and should be tested explicitely. In contrast to conventional exploratory factor analyses and internal consistency analyses, the specified measurement or validation model is accepted only if it fits the data, i.e., if it accounts with sufficient accuracy for the correlational structure within and across the measurement instruments considered.

A third advantage of structural equation modeling is that random measurement error and specific but systematic sources of variance of the indicator variables can be separated in appropriate models such as those used in multitrait multimethod designs (Widaman, 1985). In such a model, the systematic sources of variance can be specified as latent variables and used in the process of construct validation. Take, for example, two of the scales of our questionnaire for measuring sensitivity to experienced injustice, frequency and intensitiy of anger. It is unlikely that these scales measure only sensitivity to experienced injustice. Rather, the reported frequency of such events confound the ob-

jective and the subjective frequency of unjust events. Similarly, the intensitiy of a person's anger reaction to unjust treatments confounds both his or her sensitivity to experienced injustice and his or her more general anger proneness. Our measurement model takes into account this possibility. Sensitivity to experienced injustice was specified in this model as a common factor for all four scales or behavioral modes of reacting to the classes of unjust situations presented. In addition to this common factor, a specific factor was specified for each behavioral mode (scale). These specific factors are independent among each other and from the common factor. In other words, they are residual latent variables explaining proportions of variance in the scales which are systematic but irrelevent for the construct to be measured.

Such a model not only provides a precise account for the correlational structure of the measurement instrument; in addition, it makes possible to incorporate the specific factors into construct validation. In the present application, for example, Intensity of Anger (INA) is a specific or residual factor in our measurement model for Sensitivity to Experienced Injustice. A similar factor was specified as a specific emotion factor (Anger, ANG) in the measurement model for the Situation-Emotion-Questionnaire. In a simultaneous measurement model, it is possible to consider the correlations among these (and other) specific, method or residual, factors over and above the correlations among the latent trait factors representing the core constructs.

Note that this explicit separation and simultaneous consideration of systematic sources of variance is not possible in conventional convergent and discriminant validation analyses. Let's consider our application. If the scale scores from MM1 were correlated with the scale scores from MM2, method and trait components of the measures would be confounded, and it would therefore not be possible to determine the extent to which shared variance is due to shared trait variance and to shared method variance.

Unfortunately, the value of the kind of models we have specified for decomposing the manifest variables and partitioning their variances is limited by a serious pratfall: Not all correlations among the latent variables in these models are identified simultaneously. Therefore, restrictive assumptions have to be introduced which cannot be tested, even though this would be desirable theoretically. The problem is very similar to what is well known in simple common factor models. It is not possible, for example, to estimate the loadings of two indicator variables on a common factor without assuming uncorrelated measurement errors. Two parameters accounting for the same correlation cannot be estimated from one correlation.

This problem has a more general and very fundamental implication regarding the meaning of latent variables in structural equation models. The meaning of latent variables is determined neither exclusively nor exhaustively by their manifest indicators but depends in addition on the correlations with other latent variables. Consider the simultaneous measurement model in Figure 6. All loadings

of the manifest indicators were adopted from the simple measurement models. Nonetheless, not all correlations among the latent variables across the measurement models can be estimated simultaneously. Without restrictive assumptions on some of these correlations, the model is underidentified, i.e., an infinite number of solutions (patterns of correlations among the latent variables) exist which account equally well for the correlation among the manifest variables. Since any two of these solutions differ in the size of at least two correlations among latent variables, the meaning of these latent variables changes. The same is true if restrictive assumptions are introduced to solve the identification problem. These assumptions imply that the meaning of at least some of the latent variables does not depend on empirical evidence but has been given to them apriori. Consequently, the meaning of latent variables depends on theoretical or conceptual presumptions even if the relations between the latent variables and their manifest indicators have been determined empirically and remain unaffected. An implication of this may be noted in parentheses: the meaning of latent variables depends on which other latent variables have been measured and considered simultaneously in a structural equation model.

These limitations do not reflect any special disadvantages of structural equation modeling. They are fundamental epistemological issues that only become evident more clearly in this methodological approach which requires the researcher to spell out explicitely his theoretical assumptions on the causes of variation and covariation in observed behavior.

This was done in the present paper. For each of the three questionnaires used, a measurement model was specified representing apriori assumptions on latent dispositions which cause individuals' responses to the questionnaires. It was assumed, for example, that the intensity an individual's anger reaction to an unjust treatment depends additively on two dispositions, the person's sensitivity to being treated unjustly and his or her specific anger-proneness in such situations. The adequacy of this and other assumptions was not taken for granted but tested by comparing the corresponding measurement model against competing models. It was tested, for example, if one of the latent dispositions mentioned might be superfluous, e.g., if the intensitiy of an individual's anger reaction to an unjust treatment might depend only on his or her sensitivity to experienced injustice but not on a specific anger proneness of the person.

It could be demonstrated that from the theoretically meaningful alternative measurement models, most fitted worse and none fitted significantly better than our apriori models. Therefore, our apriori models were accepted and combined into a simultaneous measurement and validation model. This simultaneous model includes all those correlations among the latent variables from the separate measurement models which were both theoretically meaningful and mathematically identified.

Regarding the separate measurement models, the most important results of our investigation were the following:

(1) The four scales of the questionnaire for measuring sensitivity to experienced injustice measure this disposition as a common factor or latent trait. In addition, the four scales measure specific factors or dispositions, e.g., the intrusiveness of thoughts about the unjust event or the anger proneness in such situations. These four factors are independent among each other and from the common trait factor, and they may be interpreted as method factors.

(2) The Situation-Emotion-Questionnaire measures four factors. Using concepts from multitrait multimethod approaches, two factors may be considered as trait factors, and two as method factors. The trait factors were (a) an individual's disposition to react emotionally to being treated unjustly and (b) his or her disposition to react emotionally to frustrating events. The two method factors were (a) someone's disposition to become angry in unjust or frustrating situations and (b) someone's disposition to be disappointed in such situations. The trait factors were (assumed to be) correlated among each other and the method factors were (assumed to be) correlated among each other, but the trait factors were (defined to be) independent from the method factors.

(3) The measurement model for the German version of Spielberger's State-Trait-Anger-Expression-Inventory contains as factors a person's general anger proneness (Trait Anger) and two ways of dealing with one's anger, keeping it private (Anger-In) versus expressing it openly (Anger-Out). The correlation between Trait Anger and Anger-Out was high but significantly smaller than 1 (.80). A slightly negative correlation (-.33) was found between Anger-Out and Anger-In. Finally, Trait Anger and Anger-In were found to be uncorrelated.

The most important results for the simultaneous measurement and validation model were the following:

(a) In line with our expectations and in support of convergent validity, the common trait factor of the four scales of the questionnaire for measuring sensitivity to experience injustice had the highest correlation of .81 with the common trait factor "Emotional Reactivity to Unjust Treatment" of the Situation-Emotion-Questionnaire.

(b) Substantial correlations of .59 were found between the two common factors just mentioned and the second common trait factor of the Situation-Emotion-Questionnaire, "Emotional Reactivity to Frustrating Events". As was discussed in more detail above, this correlation may mean that mere frustrations are rare and that most frustrating events imply the violation of normative expectations.

(c) Most of the correlations among the method factors accord to the substantive interpretations of these factors and support the construct validity of the questionnaires. For example, the anger method factor from the model for the questionnaire measuring sensitivity to experienced injustice cor-

relates higher with the anger method factor from the model for the Situation-Emotion-Questionnaire than with the disappointment method factor from this model (.61 versus .33). Furthermore, both anger method factors correlate substantially with trait anger from the model for the German version of Spielberger's State-Trait-Anger-Expression-Inventory (.76 and .50).

As a second example, consider the correlations of the method factor "Punitivity" from the first measurement model with the anger expression factors from the third measurement model. We had expected that the desire to rebuke or punish the perpetrator correlates positively with the disposition to express anger openly. On the contrary, no or even a negative correlation was predicted between punitivity and the disposition to swollow one's anger. The empirical correlations correspond to these assumptions. The correlation between punitivity and anger-out was .58, whereas the correlation between punitivity and anger-in was not significantly different from zero.

There were, however, some correlations among the method factors that contradicted our assumptions and some of the restrictions we had introduced for identifying the simultaneous measurement model. Most importantly, the method factor "Frequency" from measurement model 1, which was interpreted as the objective frequency of experienced injustice, i.e., the frequency of experienced injustice freed from subjective interpretations (the person's perceptual threshold), was correlated significantly and substantially with trait anger (.47). This correlation could be interpreted developmentally in that a person's trait anger increases as a function of frequent unjust treatments. Yet this interpretation is not consistent with the mutual zero-correlation among the method or residual factors in this model including "Frequency" and "Intensity of Anger". A resolution of this contradition is not possible within our simultaneous measurement model due to the identification problem discussed in detail above. Again, this is not a special problem of our formal approach, but it becomes more evident in this approach because of the explicit decomposition of manifest variables into latent factors.

In summary, we have demonstrated the potentials and limits of structural equations modeling for specifying latent variables as factors of manifest measurement variables and testing their construct validity. Using this formal approach, we have been able to provide first empirical evidence for the convergent and discriminant validity of measures for the construct of Sensitivity to Experienced Injustice. As always, further research is needed both to resolve some of the inconsistencies in our findings and submitting consistent findings to addition empirical investigations.

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APPENDIX

Sensitivity to Experienced Injustice

Frequency of Experienced Injustice

[Response scale: Six-point rating scale from 1/seldom to 6/often]

1. I am taken advantage of by others ...
2. Things are being withhold from me ...
3. I am being treated or judged unfairly by others ...
4. Credit that I deserve is being withhold from me ...
5. Others take advantage of me without compensating me ...
6. I perform better than others without getting any appreciation or reward ...
7. I have to iron out other's negligence ...
8. I deserve more in turn for my efforts and achievements than I get...
9. I get less chances than others to develop my talents ...
10. Others are better off than me without deserving it ...
11. I have to work hard for a goal that others reach without any effort ...
12. Even though I know things better than others, I do not get the chance to prove it ...
13. Others are being treated more friendly than me without reason ...
14. I experience more difficulties than others ...
15. I get less attention than others ...
16. I am being critisized for often than others ...
17. Others are being treated better than me ...
18. While others get a lot of support, I have to struggle on my own ...

Intensity of Anger

[Response scale: Six-point rating scale from 1/not at all to 6/very much]

1. If I am taken advantage of by others, I get angry ...
2. If things are being withhold from me, I get angry ...
3. If I am being treated or judged unfairly by others, I get angry ...
4. If credit that I deserve is being withhold from me, I get angry ...
5. If others take advantage of me without compensating me, I get angry ...
6. If I perform better than others without getting any appreciation or reward, I get angry ...
7. If I have to iron out other's negligence, I get angry ...
8. If I get less in turn for my efforts and achievements than I deserve, I get angry ...
9. If I get less chances than others to develop my talents, I get angry ...
10. If others are better off than me without deserving it, I get angry ...
11. If I have to work hard for a goal that others reach without any effort, I get angry ...
12. If I know things better than others, but do not get the chance to prove it, I get angry ...
13. If others are being treated more friendly than me without reason, I get angry ...
14. If I experience more difficulties than others, I get angry ...
15. If I get less attention than others, I get angry ...
16. If I am being critisized more often than others, I get angry ...
17. If others are being treated better than me, I get angry ...
18. If I have to struggle on my own while others get a lot of support, I get angry ...

Intrusiveness of Thoughts

[Response scale: Six-point rating scale from 1/exactly true to 6/completely wrong]

1. It preoccupies me if I have been taken advantage of by others.
2. If things have been withhold from me, I muse upon it quite long.
3. I can hardly forget if I have been treated or judged unfairly by others.
4. It burdens me if credit that I deserve has been withhold from me.
5. I hardly get over it if others take advantage of me without compensating me.
6. It preoccupies me if I perform better than others without getting any appreciation or reward.
7. If I have to iron out other's negligence, I ruminate upon it quite long.
8. I can hardly forget if I get less in turn for my efforts and achievements than I deserve.
9. It burdens me if I get less chances than others to develop my talents.
10. I hardly get over it if others are better off than me without deserving it.
11. It preoccupies me if I have to work hard for a goal that others reach without any effort.
12. If I knew things better than others, but did not get the chance to prove it, I muse upon it quite long.
13. I can hardly forget if others have been treated more friendly than me without reason.
14. It burdens me if I experience more difficulties than others.
15. I hardly get over it if I get less attention than others.
16. It preoccupies me if I have been critisized more often than others.
17. If others have been treated better than me, I ruminate upon it.
18. I can hardly forget if I had to struggle on my own while others got a lot of support.

Punitivity

[Response scale: Six-point rating scale from 1/exactly true to 6/completely wrong]

1. If someone takes advantage of me, I have the desire to accuse him for it.
3. If I have been treated or judged unfairly by others, I want to pay them back for it.
4. If someone witholds from me the credit I deserve, I feel like telling him.
5. If others take advantage of me without compensating me, I wish to pillory it.
6. If I perform better than others without getting any appreciation or reward, I wish to pillory it.
8. If someone gives me less in turn for my efforts and achievements than I deserve, I have the desire to accuse him for it.
10. If I see that others are better off than me without deserving it, I wish to pillory it.
11. If I have to work hard for a goal that others reach without any effort, I wish to pillory it.
14. If I experience more difficulties than others, I want to pay back for it.
16. If I have been critisized more often than others, I want to take revenge for it.

Situation-Emotion-Questionnaire
(anger and disappointment in unjust and frustrating situations)

In the following, only the description of the situations is given. Each situation was followed by two questions: (a) How angry would you be in this case? (b) How disappointed would you be in this case?. The response scales for both anger and disappointment were six-point rating scales ranging from 1/not at all to 6/very much.

Unjust Situations

1. Imagine you are standing in line and someone pushes forward.

2. Imagine one of your colleagues is given credit for something you have accomplished and your colleague doesn't rectify this error.

3. Imagine another applicant gets the job that you have also applied for. You find out that the other applicant was preferred because of his personal relations to the chair person of the search committee.

4. Imagine you are in a bakery. Someone who entered the bakery after you is served first.

5. Imagine you want to visit a discotheque. You are not allowed to enter although other persons are admitted.

6. Imagine you get a bad grade in an exam because your neighbour copied from you without your knowledge.

7. Imagine you have been on the waiting list for admission to a university for several years. You find out that other applicants were admitted immediately because they used some tricks.

8. Imagine that you are sitting in a restaurant and waiting to be served. Other guests who had arrived after you, are served first.

9. Imagine you partizipate in a lottery. Every third lot wins. Unlike all your friends who have won something, you haven't won anything although you bought a dozen lots already.

10. Imagine you are being fined by two policemen for a traffic violation which you haven't committed, however. You cannot prove your innocence and have to pay.

Frustrating Situations

1. Imagine you buy an expensive jacket after brief deliberation. Afterwards you dicover that you could have got the same product much cheaper in another store.

2. Imagine you searching for your car keys. Suddenly you recognize that the keys are in your car and the door is closed.

3. Imagine you want to cross a frequented road. The density of traffic is high so that you have to wait for a long time.

4. Imagine a full plastic-bag rips and the content is falling on the street.

5. Imagine you are standing in a queue in the dinning-hall and have to wait for a long time. If it is your turn you learn that the disired food run short.

6. Imagine you are in a hurry. You are stopped by the police for just reasons because you have been driven to fast.

7. Imagine you are standing at the cash-box in a supermarket recognizing that you forget your money.

8. Imagine you are working in a restaurant. Because of bad business-situation you have to renounce the cristmas-gratification.

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