Manfred Schmitt, Mario Gollwitzer, Anna Baumert, Tobias Gschwendner, Wilhelm Hofmann & Tobias Rothmund


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Abstract

Marshall and Brown (2006) proposed a *Traits as Situational Sensitivities (TASS)* Model that implies a systematic person × situation interaction. We review this model and show that it suffers from several limitations. We extend and modify the model in order to obtain a symmetric pattern of levels and effects for both person and situation factors. Our extension reveals striking similarities with the Rasch model. Based on the symmetric nature of our modified TASS model, we generalize the concept of weak and strong situations to individuals and propose the concepts of weak and strong persons. Finally, we discuss psychological mechanisms that might explain the TASS pattern and offer ideas for future research.

*Key words:* interactionism — person × situation-interaction — Rasch Model — weak situations — strong situations — weak persons — strong persons
Marshall and Brown (2006) proposed a *Traits as Situational Sensitivities (TASS) Model* that addresses an important issue that each theory of behavior has to address: How do personality factors and situation factors *jointly* shape behavior? The TASS model is a person × situation-interaction model. Like all person × situation-interaction models, it challenges the assumption that personality and situation factors influence behavior additively. The TASS model assumes a characteristic type of deviation from additivity, and thus a specific person × situation interaction.

Marshall and Brown (2006) use aggression as an example for illustrating their model. Consensus has been achieved in the aggression literature that aggressive behavior in a given situation is a function of aggression-related personality traits and of the provoking potential of the situation (cf. Bettencourt, Talley, Benjamin, & Valentine, 2006). Less agreement has been obtained regarding *how* both factors interact in shaping behavior. Marshall and Brown (2006) assume a particular form of that interaction: According to their model, situational effects among lower levels of provocation are stronger for highly trait-aggressive individuals, whereas situational effects among higher levels of provocation are stronger for individuals low in trait aggressiveness. Thus, depending on their level of trait aggressiveness, individuals differ in their situational sensitivity, hence the model’s name. Figure 1 displays the original TASS pattern (adopted from Marshall & Brown, 2006, Figure 1A).

![Figure 1](image-url)

*Figure 1*

The original TASS model (adopted from Marshall & Brown, 2006, Figure 1A)
Although the basic idea of the TASS model is appealing, we propose that the particular way it was formulated by Marshall and Brown (2006) rests on three doubtful assumptions:

1. Whereas situation effects are non-linear across trait levels, trait effects are linear across situation levels.
2. Persons low in trait aggressiveness are not affected by a moderate provocation.
3. Trait effects are virtually zero in strongly-provoking situations.

In the first part of this article, we will challenge these assumptions. In the second part, we will show that the basic idea of the TASS model can be retained by adding a few modifications to it. These modifications, however, alleviate the doubtful assumptions of the original model. In the third part of our article, we will reveal striking similarities between our modified TASS model and the Rasch model. By relating the basic ideas of the TASS model to the psychometric concepts of item difficulty and personality effect, we will propose the concept of weak and strong persons. Finally, in the fourth part, we will address another weakness of Marshall and Brown’s (2006) contribution: its lack of psychological mechanisms that might explain the TASS pattern. We will offer some ideas on such mechanisms.

Three Doubtful Assumptions of the TASS Model

Are Linear Trait Effects Consistent with the Core Premises of TASS?

Marshall and Brown specified three levels of the situation factor but only two levels of the person factor. Since an empirical test of non-linear effects requires at least three levels, the design chosen by Marshall and Brown (2006) allows for non-linear situation effects but not for non-linear trait effects. Thus, the authors seem to assume that trait effects are linear. This means that within a given situation containing a particular level of provocation, each increase in trait level yields a constant increase in aggression. Such a linearity assumption, however, is not consistent with the TASS model’s interpretation of traits as situational sensitivities, which suggests that trait levels can be conceptualized as individual differences in thresholds for perceiving a situation as a provocation. Highly trait-aggressive individuals have a low threshold for interpreting a situation as a provocation. Moderately trait-aggressive individuals have a moderate threshold and persons low in trait aggressiveness have a high threshold. Whether or not two individuals who differ in trait aggressiveness by a given amount react with a similar or with a different degree of aggression depends on the provocation level of a given situation. If the provocation is below the thresholds of both persons, they will react similarly, i.e., with no or little aggression. If the provocation is above the threshold of both persons, they will also react similarly, i.e., with some aggression. However, if the provocation is below the threshold
of person A and above the threshold of the person B, they will react differently. Person A will react with no or very little aggression, person B with some or much. Hence, the trait effect cannot be the same across situations that differ in provocation. Thus, by implication, linear trait effects are inconsistent with the core idea of TASS.

Are Low Trait-Aggressive Individuals Unaffected by a Moderate Provocation?

The original version of the TASS model assumes that the difference between the non-provoking and the moderately provoking situations is zero for individuals low in trait aggressiveness (see Figure 1). This assumption is not plausible, and it is also not in agreement with Marshall and Brown’s (2006) own data: In all three studies, low trait-aggressive individuals reported more anger in the moderately provoking situation than in the non-provoking situation. This difference was significant in Studies 2 and 3.

Are Trait Effects Virtually Zero in Strongly-Provoking Situations?

A third assumption is that trait effects are assumed to be very small at both ends of the situational continuum (see Figure 1). Whereas this seems likely in non-provoking situations, it appears doubtful in strongly-provoking situations. Again, Marshall and Brown’s data are not consistent with their assumption. High trait-aggressive individuals reported significantly more anger as compared to low trait-aggressive individuals in the strong provocation condition. This difference was significant in all three studies.

Modifications to the Original TASS Model

We propose that slight modifications of the TASS model can remedy its weaknesses and inconsistencies. Our modification is fivefold. The first modification deals with Marshall and Brown’s choice of non-provoking situations as the lowest level of the situation factor. This choice is disadvantageous because situations containing a zero level of provocation may differ qualitatively from situations with moderate and high provocation levels. Thus, non-provoking situations cannot be mapped onto the same underlying quantitative dimension as situations containing at least some level of provocation. Therefore, we replace the non-provoking situation by a situation that contains a low level of provocation. The second modification changes the labeling of the situation levels. In order to avoid confusion with Mischel’s (1973) concept of weak versus strong situations, the situation originally labeled “strong” will be renamed “high.” The third modification remedies the doubtful assumption that low trait-aggressive individuals are unaffected by a moderate provocation. Instead, we
assume that a moderate provocation level (as compared to a low provocation level) has at least some effect on all individuals, including those low on trait aggressiveness. The fourth modification is that we allow for non-linear trait effects. This requires a third level of the trait factor. Consequently, we add a moderate trait level. The fifth modification is that we allow for larger trait effects among low and high situational provocations.

The pattern that follows from our modification of the TASS model is depicted in Figures 2 and 3. Figure 2 displays the situation factor on the X-axis, while the three trait levels are displayed as separate graphs. Figure 3 displays the trait factor on the X-axis, while the three situation levels are displayed as separate graphs. Whereas Figure 2 shows that the effect of situational provocation on aggression cannot be generalized across levels of trait aggressiveness, Figure 3 shows that the effect of trait aggressiveness on aggression cannot be generalized across levels of situational provocation.

Symmetrical Interaction Patterns

Unlike the original TASS model, our modification allows for a symmetrical person × situation interaction. A two-way interaction is symmetrical if both ways of depicting the interaction (one factor on the abscissa and the other as separate graphs) yield an identical pattern (cf. Figures 2 and 3). Figure 2 is entirely in line with the basic premise of the TASS model: The difference between low and moderate provocations is larger for high trait-aggressive individuals (as compared to low trait-aggressive individuals), whereas the difference between moderate and high provocations is larger for low trait-aggressive individuals (as compared to high trait-aggressive individuals).

Due to the symmetric nature of our model, the non-linearity of the situation effect (Figure 2) is mirrored by the non-linearity of the trait effect (Figure 3). Non-linear effects of trait aggressiveness across situations are, as we have argued earlier, conceptually implied in the threshold notion of traits as situational sensitivities. Thus, the pattern of our modified model is in better agreement with Marshall and Brown’s core ideas than is their own model.

Not that the possibility of a symmetrical person × situation interaction is precluded by the original TASS model because such a pattern of interaction requires that trait effects at low and high points on the situation dimension are equally as large as situation effects at low and high points on the trait dimension. The original TASS model, however, assumes that trait effects are virtually zero at low and high points on the situation dimension. Marshall and Brown (2006) do not offer convincing theoretical reasons for this assumption. Moreover, the asym-
metric TASS pattern is also not in agreement with a prominent psychometric model, the Rasch model. As we will show next, this model matches well with our model but not with the original TASS model.

**Figure 2**
A slight variation of the TASS model with three trait levels

**Figure 3**
The TASS pattern after exchanging the formal status of situational provocation and trait aggressiveness
Relating the TASS Model to Psychometric Theory and Psychometric Concepts

Linking the Modified TASS Model to the Rasch Model

Marshall and Brown (2006) did not link the TASS pattern to any psychometric theory. Such a link seems possible because psychometric theories imply models that serve the same purpose that the TASS model is designed for. Just like the TASS model, psychometric theories describe the functional relationship between behavior and causes of behavior. We propose that the TASS model, yet only in our modified version, can be linked very well with the Rasch (1960) model. This is true because, unlike the effect pattern of the original TASS model, the effect pattern of the modified TASS model is highly similar to the characteristic curve of the Rasch model. We claim that this similarity adds to the plausibility of our modifications and supports our critique of the original TASS model.

The Rasch model describes how the probability of solving a task, for instance an item from an intelligence test, depends simultaneously on the item’s difficulty and the person’s ability. Item difficulty and person ability are conceived of as continuous variables that can be projected onto the same interval scale. Solving versus not solving an item is a binary event. According to the Rasch model, such an event can neither depend linearly on item difficulty nor linearly on person ability. Item Characteristic Curves (ICC) describe how the probability of solving an item depends both on the item’s difficulty and on the ability of the person considered. These concepts - item difficulty and person ability - originate from ability testing. Given their formal definition, however, these concepts can be applied to any psychological domain in addition to ability. Figure 4 presents the ICCs of two items, Situation A and Situation B, the former having a higher level of provocation than the latter. Figure 5 depicts Person Characteristic Curves (PCCs) of two persons who differ in trait aggressiveness.

Ignoring for the moment that the dependent variables of the TASS model and the Rasch model have different scales, the former being an intensity scale and the latter being a probability scale, a striking similarity can be observed when comparing Figures 2 and 5. In both figures, the difference in the degree or in the likelihood of aggression between a person high in trait aggressiveness and a person low in trait aggressiveness is smaller in situations that have either a low or a high provocation level as compared to moderately provoking situations. The same similarity can be observed when comparing Figures 3 and 4. In these two figures, the difference in the degree or in the likelihood of aggression between a situation low in provocation level and a situation high in provocation level is smaller for people who are
either high or low in trait aggressiveness as compared to people with a moderate level of trait aggressiveness. These similarities become even more obvious when we integrate the modified TASS model and the Rasch model graphically into Figures 6 and 7. These Figures also demonstrate that the expected levels of aggression for individuals with a moderate trait aggressiveness level and for situations with a moderate provocation level fit well with the corresponding ogives of the Rasch model.

**Figure 4**
Item characteristic curves of two situations differing in degree of provocation

**Figure 5**
Person characteristic curves of two individuals differing in trait aggressiveness
One might object that the binary behavior scale of the Rasch Model (displaying aggression vs. not displaying aggression) and the interval behavior scale of the TASS model (intensity of aggression) prohibit a direct comparison of both models. This is true, of course,
in a formal sense. However, the basic idea and purpose of the Rasch Model may enhance the understanding of the modified TASS pattern and this is why linking both models on a conceptual level is inspiring. The Rasch Model was proposed to handle the prediction of behavior that is limited in range. The very same reasons, i.e., limits to the intensity or frequency range of behavior, may also explain data patterns that are consistent with the modified TASS model. In fact this seems highly likely because most psychological variables are not endless, but limited in range. These limits do not need to be artifacts resulting from tailored scales. Rather, they may be due to biological limits or social limits or limits imposed by the person via self control.

Many examples could be given for such limits. In mono-polar constructs, such as anxiety or aggression, a lower bound of a behavior scale is obvious because it is defined by the total absence of any relevant behavior. Moreover, it is also plausible to assume that both the frequency and the intensity of behaviors have upper bounds. If we measure aggression as the intensity of punching an object or another person, there certainly is an upper intensity limit. If we measure spider phobia as the speed of running away from spiders, there clearly is a biologically determined upper limit to the scale as well.

Upper boundaries of behavior variables will not originate only from biological causes. They might also be invoked by social factors and self-regulation processes. Many extreme behaviors such as aggression meet with social disapproval because they deviate from a social norm. Because people are generally aware of social norms, able to anticipate the negative consequences of violating these norms, and motivated to avoid negative consequences, they engage in self control and self regulation. Quite often, avoiding negative consequences can be achieved only by behaving within the limits set by a norm.

Of course, these examples do not cover the entire spectrum of human behavior, but they are suggestive examples illustrating that both the intensity and the frequency of behavior often cannot vary endlessly. Whenever this is true, the modified TASS model will be superior to models that assume additive linear effects.

*Weak and Strong Situations*

Marshall and Brown (2006) have linked their model to the concept of *weak* and *strong* situations (e.g., Mischel, 1973; Price & Buffard, 1974). Strong situations can be defined as situations in which individual differences in behavior are restricted, for instance due to norms, conventions, and rituals. Strong situations trigger uniform behavior. Very few people deviate
from the norm. By contrast, weak situations can be defined as situations in which individual differences in behavior are unrestricted because no standardizing norm is salient. Marshall and Brown (2006) apply this concept to aggressive responding to situational provocations. They implicitly argue that very low and very high provocation levels are special cases of strong situations. This is why they assume trait effects to be virtually zero in these conditions (see Figure 1).

In psychometric terms, a situation containing low levels of provocation would be a *difficult item*, because almost nobody will behave aggressively. A situation containing high levels of provocation would be an *easy item*, because many people will react aggressively. Because the interindividual variability of behavior is reduced in strong situations, these situations cannot discriminate between people as well as weak situations can. This principle is well known in psychometrics. Very easy and very difficult items are less able to discriminate between individuals than moderately difficult items.

**Figure 8**

Links between the concepts of situation strength, item difficulty, personality effect, and item-total correlation

Figure 8 integrates the concepts and principles we have discussed. First, Figure 8 shows how weak and strong situations are related to easy and difficult items. Second, Figure 8 shows that difficult and easy items have little discriminative power (low item-total correlations) as compared to moderately difficult items. Third, Figure 8 shows that the impact of
personality traits on behavior, sometimes called personality effect, depends monotonically on the strength of the situation. Given the curvilinear relation between the strength of a situation and its difficulty, the impact of personality traits on behavior also correlates curvilinearly with the difficulty of situations.

*Weak and Strong Persons*

Weak versus strong situations generate only one among several possible person × situation-interaction patterns. If extreme, they may prohibit any trait effect. A provocation may be so strong (psychometrically easy) that everybody reacts aggressively to it. Other (psychometrically difficult) situations may contain so little provocation that nobody reacts aggressively. Thus, combining extremely strong and extreme weak situations implies that *the situation shapes the magnitude of trait effects.*

![Figure 9](image)

Links between the concepts of person strength, person ability or trait level, and situation effect

Now let us consider a different person × situation-interaction model that makes entirely different predictions. In that interaction model, *personality shapes the magnitude of situation effects* such that the possible range of situation effects is determined by the person’s trait score (and not vice versa). In psychometric terms, we might talk of *strong and weak persons* (instead of situations). *Strong persons* display little intra-individual differences in behavior across situations. Very low and very high trait levels are *special cases* of strong persons. For example, people that are extremely low in trait-aggressiveness might respond non-
aggressively regardless of how strongly they are provoked. People extremely high in trait-aggressiveness might respond aggressively regardless of how mildly they are provoked. In contrast, moderately trait-aggressive individuals show considerable variation in aggressive responding across a range of different provocation levels. Thus, people with moderate trait levels represent weak persons. Figure 9 demonstrates how person strength, trait level, and situation effect are related to each other. Note that such a model makes entirely different predictions than the original TASS model. The original TASS model makes clear assumptions regarding the relative strength of person and situation effects. It assumes that situations shape the magnitude of trait effects, but not vice versa. However, Marshall and Brown’s own data do not support this choice.

Our modified version of the TASS model reconciles both kinds of person \times situation-interaction models: It assumes that the range of trait effects is smaller among low and high levels of the situation factor, and it also assumes that the range of situation effects is smaller among high and low levels of the trait factor. The pattern depicted in Figures 2 and 3 suggests that the way situations shape the magnitude of trait effects is identical to the way personality shapes the magnitude of situation effects. This symmetry assumption is well in line with the Rasch model and the Rasch model has received empirical support in many applications.

**Explanatory Limits of the TASS Model**

The TASS model is a descriptive model. It does not specify psychological mechanisms that cause the pattern of behavior it predicts. Given its descriptive nature, complementing the TASS model with substantive theory will increase its scientific value. Marshall and Brown (2006) propose the general threshold concept as an explanation for the TASS pattern. The threshold concept has two limits, however. First, it is not an explanatory concept. Second, it cannot explain why initial differences in behavior between individuals become increasingly larger as we move from difficult to moderately difficult situations. It can also not explain why individual differences in behavior become smaller again as we move from moderately difficult situations to easy situations. These properties of the TASS model would require complementing the threshold concept with the concept of thresholds for the perception of differences between situations. Yet even adding these thresholds would not satisfy the need for substantive explanation. What theories might contain explanations for the TASS pattern? We close our critical comment by offering a few ideas.

Several theories predict synergistic interactions, i.e., the diverging slopes part of the
TASS model as shown in Figures 1 and 2. Well-known examples are the state-trait anxiety and anger theories proposed by Endler (1975) and Spielberger (1972). Several psychological principles have been proposed for explaining synergistic interactions, the most influential being schema theory (Markus, 1977). Schemata filter and guide information processing such as attention, information search, memory, and complex inferences like causal attributions. Because the availability and accessibility of schemata vary with underlying personality traits, information is processed in congruency with these traits (Rusting, 1998). Persons high in a certain trait detect minimal trait-congruent characteristics in ambiguous situations due to selective attention and selective information search. They give more weight to trait-congruent information in judgment and decision processes than to irrelevant or incongruent information also available in an ambiguous situation. Highly trait-anxious individuals, for instance, selectively attend to threatening information and put more weight on threat signals than on security signals. As a consequence, they are not only alarmed earlier than individuals low in trait anxiety but also react more strongly to situations that differ in threat (Endler, 1975). Highly aggressive individuals, to give a second example, have schemata that include a hostile attribution bias (Dodge, 1980). They tend to interpret an ambiguous disturbing event more readily as the consequence of purposeful behavior and thus as a provocation. Consequently, they are prone to respond to slight provocations with counter-aggressive and retaliatory acts.

The mechanisms that turn the synergistic or conjunctive interaction (diverging slopes in Figures 1 and 2) into a disjunctive interaction (converging slopes in Figures 1 and 2) have been addressed less often in the literature. Earlier in this paper we argued that biological outfit and social norms put limits on the frequency and intensity of many behaviors. Most likely, these are not the only mechanisms. The schema concept that has been employed for explaining synergistic interactions may also explain why this interaction turns over into a disjunctive interaction at a certain point on the difficulty scale of situations.

The application of schema theory to the disjunctive part of the TASS interaction seems possible if we make three assumptions. First, we assume that a cognitive schema works like a pattern recognition tool: A critical number of elements that define the pattern have to be identified before the Gestalt of the pattern will be recognized. Second, we assume that a difficult situation contains fewer or less obvious hints to elements that define the pattern. Accordingly, easy situations contain more or more obvious hints to critical elements. Third, we assume that individuals high on a trait have more sensitive and finely tuned schemata and will, for this reason, more easily recognize and combine the elements of a pattern. Combining all
three assumptions implies that the situation schemata of individuals high on the trait will be *saturated* relatively fast compared to individuals low on the trait. For people low on the trait, more obvious hints or a larger number of them are necessary to activate the schema and this will happen more likely in easy situations than in difficult situations. For people high on the trait, additional information contained in easy situations is redundant because their schema can be fully activated with a smaller number and less obvious hints to critical elements. Additional information at a certain point cannot increase the degree of activation of a specific schema. This idea is speculative. However, it is consistent with the TASS model and adds an explanatory component to this model. Moreover, it is a parsimonious idea because it can explain both parts of the person × situation interaction, i.e., its synergistic or conjunctive part and its disjunctive part.

**Directions for Future Research**

More research is needed before the modified TASS model can be accepted as a general person × situation-interaction model of behavior. Future research has to solve three major tasks. *First*, more studies are needed to test the generalizability of the model across a wide range of behaviors. *Second*, our brief analysis suggests that although the model might be a general and robust model on the descriptive level, several biological and psychological mechanisms might be responsible for the characteristic pattern. Probably, more explanations are possible and plausible than the few that we have discussed. *Third*, any empirical test of the modified TASS model requires at least three levels of the situation factor. If we assume that situation factors are metric in nature, as was assumed in the studies conducted by Marshall and Brown (2006), then a proper scaling of the situational variable is crucial. For example, what defines low, moderate, and high levels of situational provocation? Whereas measures of personality variables have well-known scales and distributions, almost no measures are available for situational variables such as the level of provocation.
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Author Note

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Correspondence regarding this article should be addressed to Manfred Schmitt, Department of Psychology, University of Koblenz-Landau, Fortstrasse 7, 76829 Landau, Germany. E-mail: schmittm@uni-landau.de
Footnotes

1 Note that Figure 1 and the remaining figures represent relations between independent and dependent variables schematically. Therefore, the figures do not contain scale units. The scales may differ between substantive applications of the model and between measures for the variables to which the model is applied. Therefore, the values labeled “low,” “moderate,” and “high” do not represent well-defined points on a scale. Rather, they indicate ranges on the scale that measure the constructs according to Marshall and Brown (2006) or constructs of other applications of the TASS Model. Only the ordinates of Figures 4 and 5 are well defined. They represent the probability scale that ranges from 0 to 1.

2 On ability tests, easy items are items that have a higher probability of endorsement, even by people with low ability, and are thus located on the left side of the ability scale. Items that are more difficult have a low probability of being endorsed until a person has a higher ability level, and thus, these items are located further to the right on the ability scale. Transferring this idea to the domain of aggression explains why “Situation A: High provocation level” is located on the left side of the scale - because it does not take much trait aggressiveness (or “ability”) in this situation to act aggressively with some probability. Likewise, “Situation B: Low provocation level” is analogous to the difficult item, and is thus located on the right side of the scale where it takes a higher level of trait aggressiveness to have some probability of responding in this situation.

3 Trait-aggressiveness does not appear to fit well into the “weak” vs. “strong” situation framework. In a recent meta-analysis, Bettencourt et al. (2006) have shown that trait-aggressiveness actually predicts aggressive behavior regardless of the situational provocation level. In other words, trait-aggressiveness yields main effects, but interactions with situational provocations are much less frequent. Other traits such as impulsivity, emotional susceptibility, or narcissism yielded much larger interactions with situational variations.
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