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Social Behavior Inventory: To Ipsatize or Not To Ipsatize, That Is The Question

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Social Behavior Inventory: To Ipsatize or Not To Ipsatize, That Is The Question

by

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Abstract

This research extends prior knowledge of the statistical procedure of ipsatization, commonly utilized in interpersonal research to align data with theoretical expectations. The working hypotheses in prior studies have posited that a general factor, representing a response bias with no relevant substantive meaning, alters the data and interferes with analysis and interpretation unless removed by ipsatization. In the first of two studies, we initially investigated whether ipsatization removes important conceptual information from data when it removes a general factor. Three potential meanings of the general factor expected to occur in the Likert-scale version of the Social Behavior Inventory (SBI; Moskowitz, 1994) were modeled. When the resulting models did not adequately predict the data, the underlying structure of the data was analyzed with the discovery that a general factor does not exist for this version of the SBI. During study 2, this discovery was replicated in two larger datasets, leading to an investigation into whether ipsatization is still useful for a measure that does not possess a general factor. Despite a lack of a general factor to be removed, ipsatization did improve the structure and correlation patterns of SBI data with the resulting patterns matching those predicted by interpersonal theory. Thus, ipsatization can still be performed on this measure, which does not possess a general factor, thereby suggesting that the mechanism by which ipsatization improves data may not simply be the removal of a general factor as previously assumed. Several alternative mechanisms are discussed, with future research required to fully understand how ipsatization transforms the structure of data.

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When research investigates the constructs of interpersonal behaviours (Moskowitz, 1994), values (Locke, 2000), efficacy (Locke & Sadler, 2007), and personality traits (Wiggins, Trapnell, & Phillips, 1988), the questions usually explore the predictive and explanatory ability of such constructs. For example, prior studies have explored the relationship between interpersonal values, efficacy and behaviours (Locke & Sadler, 2007), or between people's behaviour during an interaction (Sadler & Woody, 2003). In nearly every interpersonal study[1], a data transformation procedure called ipsatization is utilized. Ipsatization transforms each participant's ratings relative to that person's average response, so that the total (and mean) of those scores are zero (or another constant for all people; e.g., Greer & Dunlap, 1997), thereby resulting in scores whose values represent deviations from that person's average (Wiggins, Steiger, & Gaelick, 1981).

This current research aimed to critically and empirically explore the rationale and consequences of a data transformation process called ipsatization, in particular whether ipsatization removes an irrelevant nuisance variable when it removes the data's general factor or inadvertently removes something that is important and actually should not be removed. Our research examined the general factor of a specific measure, namely the

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[1] Notable exceptions are studies where the only interpersonal measure is the IAS-R (Wiggins et al., 1988) and studies that only use dimension scores (e.g., Zeigler-Hill, 2006), vector scores (Locke, 2006), or structural summary method (e.g., Ansell & Pincus, 2004).

Social Behavior Inventory (SBI; Moskowitz; 1994). Knowledge of what ipsatization removes from data would allow for more informed decisions regarding its use.

Interpersonal theoretical framework

Beneath the questions asked in interpersonal research is a specific structure that is posited to underlie all interpersonal constructs, such as values, traits, and behaviours, as well as the measures and resulting data utilized to assess these constructs. This framework is characterized by the interpersonal circumplex (see Figure 1; e.g., Carson, 1969; Kiesler, 1983, 1996; Leary, 1957).

Interpersonal circumplex. Comprised of two orthogonal dimensions that are represented by two lines 90 degrees apart on a circular plane, the interpersonal circumplex places two dimensions at the basis of interpersonal theory. The vertical dimension, dominance or agency, represents how in charge a person is, how much a person values being in control or how often they do leading behaviours, with lower dominance being reflected in being docile, valuing going along with others, and behaving in a way that avoids leading (e.g., Wiggins & Holzmuller, 1981). The horizontal dimension, affiliation, represents how friendly a person is, how much a person values kindness, or does sociable behaviours. Lower amounts of affiliation are reflected in people being hostile by confronting others (e.g., Kiesler, 1996), or disengaged by avoiding others (e.g., Horowitz, 2004), depending on the framework utilized. For this research, low affiliation is viewed as being hostile.

Four poles are posited to exist at the ends of the two dimensions as displayed in Figure 1 that divide the circumplex into quadrants . Additional sub-scales can further divide up the circumplex, into octants or sixteenths (e.g., Kiesler, 1983).

Entailed expectations. Based on the two dimensional circumplex, the expected factor structure for interpersonal data containing the ratings of many individuals at one time consists of two factors, one for dominance and one for affiliation. A specific pattern of correlations between the four poles is entailed by this structure. As dominant and submissive poles are at opposite ends of the same dominance dimension (just as friendly and unfriendly are on the affiliation dimension), these behaviours exist in opposite amounts in people. The dimensional structure entails that people who are more dominant are less submissive (and vice versa); this trade-off is reflected by a negative correlation (e.g., $r = -1$). As dominant people can vary along the spectrum from very friendly to very unfriendly (and the same for a submissive person), there is no trade-off or even relationship between the dominant pole and either of the two poles on the affiliation dimension. This lack of relationship holds for each set of poles from different dimensions, and is captured in correlations of zero (e.g., $r = 0$).

There is a structural basis for these correlations, based on whether or not the two poles being correlated share the same dimensional factor or not. Since poles on different factors are expected to have neither factor in common, they would have no relationship (i.e., zero correlation). However, the poles, which are at opposite ends of the same dimension, are expected to share that factor in common, although in opposite directions, so they would have an opposite relationship (i.e., negative correlation). Displayed in a correlation matrix, these relationships between poles would appear as the specific pattern shown in Table 1 (e.g., Wiggins, 2003).

Actual data, however, does not always fit these expectations, with correlations that are more positive than expected, such as those reported by Sadler (1997). The

correlations based on data from 397 respondents on the Likert-based Social Behavior Inventory measure are shown in Table 2. Instead of the negative values expected for correlations of poles at opposite ends of the same dimension, the correlations were very small. In addition, instead of the near-zero values expected for the correlations between poles on different dimensions, the correlations were somewhat or slightly more positive. This shift in correlations is posited to be due to the existence of an additional factor that all four poles share. All items are expected to load positively and highly on this factor, thereby resulting in positive relationships with each pole and subsequently more positive correlations between poles. Such a factor is usually referred to as a general factor, and is thought to be an additional shared factor whose presence makes the pole correlations more positive (e.g., Horowitz, Rosenberg, Baer, Ureno, & Villasenor, 1988; Tracey, 2000).

Ipsatization

To remedy these deviations in the data from the theoretically expected structure and correlations by removing a suspected nuisance factor, a statistical procedure known as ipsatization is performed. This process is posited to remove a general factor that is thought to be masking or confounding the real two-dimensional structure (e.g., Gurtman, 1994; Tracey, 2000). Mathematically, ipsatization is similar to the first step in standardizing data, where the mean of all of a participant's ratings in the measure is subtracted from each individual item rating made by that participant, thereby producing scores that represent the distance between each item's score and the participant's own mean (e.g., Bartholomew & Horowitz, 1991). Such scores are centered around the participant's mean, with positive scores indicating ratings above the person's average

rating and negative scores indicating ratings below the person's average rating. The resulting total (and mean) of these ipsatized scores is always zero for each participant.

Unlike standardization, the distance from the mean is not divided by the amount of variability (i.e., the standard deviation), and as such the meaning of the distance cannot be directly compared across participants. For example, researchers can directly compare a score of .5 and .8, whereas they could not directly compare ipsatized scores as a .5 difference would be large for a person with low variability but a .8 difference would be small for a person with greater variability. In other words, the deviation from the mean is represented, but the units are not a standard unit that allows for inter-individual comparisons. These ipsative scores, as first described by Cattell (1944), are measurements relative to the individual. Thus ipsatized scores mathematically represent deviations from a person's average rating, and have been posited as a superior set of data upon which to conduct further analyses due to improved circumplex properties (Soldz, Budman, Demby, & Merry, 1993; Wiggins, Steiger, & Gaelick, 1981). This latter attribution would only be true if ipsatization actually removes a nuisance variable.

Ripple effects in variance. While removing a general factor from the data, ipsatization alters not only the structure and correlations, but also removes a substantial amount of variance from sub-scales representing the four poles. The proportion of variance lost during ipsatization varies across the sub-scales, ranging from about 20 percent for the submissive sub-scale to at least 50 percent for the remaining dominant, agreeable (or friendly) and quarrelsome (or unfriendly) sub-scales (as shown in Table 3 from Hoessler, Sadler, & Woody, 2007). Thus this statistical procedure removes

substantial variability in the data often without prior understanding of what exactly is being removed.

Meaning of general factors

The variance being removed may be tied to a conceptual meaning of a general factor that is removed during ipsatization. Given that ipsatization is posited to remove a general factor, this process would be expected to remove the meaning and explanatory ability of any concept represented by that general factor. Clemans (1966) posited that ipsatizing data removes the main component and thus most of the data's interesting variance. While removing biases or other concepts not of interest to researchers might be useful or at least not harmful, there is the possibility that important and relevant concepts may be lost. The meaning of a general factor for a particular interpersonal measure has been shown to differ between measures with not all general factors possessing the same meaning as discussed below. This may be due to the meaning of a measure's general factor being related to the concepts assessed by the measure's questions and items, as well as the wording.

In the measurement of interpersonal problems. One particular measure whose general factor has been examined is a measure of how distressing a person finds different types of interpersonal difficulties, named the Inventory of Interpersonal Problems (IIP-C; Alden, Wiggins, & Pincus, 1990). Research into the meaning of the IIP-C's general factor by Tracey, Rounds, and Gurtman (1996) determined that the IIP-C had a three factor structure with the theorized dominance and affiliation dimensions, as well as a general factor related to the overall level of distress expressed by the person (also labeled as such by Horowitz et al., 1988). These conclusions were based on the high correlations

between participants' factor scores for the general factor found in exploratory factor analyses with their mean rating of the IIP-C items, their rating of problem endorsement, and their rating of negative affect.

Tracey and colleagues (1996) further argued that this general factor should not be simply removed or reduced without thorough consideration, based on the meaning of the general factor that is definitely present in IIP-C data. For example, in the case of the IIP-C, removing its general factor from subsequent analyses may have negative implications for making predictions or modeling the effectiveness of therapy. The process of ipsatization involves subtracting people's means from their own scores. The meaning of this IIP-C mean has been investigated by Soldz and colleagues (1993). Their research examining the relationships between the IIP-C mean and scales of the Big Five factors (Costa & McCrae, 1992) as measured by the 50-Bipolar Self-Rating Scales (Goldberg, 1992) found that the IIP-C mean was negatively correlated (r = -.55) with emotional stability (so positively related to neuroticism), as well as being negatively correlated with extraversion (r = -.37) and the big five agreeableness factor (r = -.37). Thus the mean (and the general factor) appear to possess substantive meaning that may be lost when ipsatization is performed to transform data.

Additional analyses by Tracey et al. (1996) of the three dimensions that make up the underlying structure of the IIP-C indicate that the parameters of circumplex varied along the IIP-C general factor (such that lower levels of the general factor were related to less differentiation among the IIP-C octant sub-scale ratings). This variation in interpersonal rigidity would be lost when ipsatization removes the IIP-C general factor, thereby collapsing the data across this third dimension; any potential information

represented by that variation would be lost. While they do note that ipsatization is useful for producing data with an underlying structure that matches the circumplex, at the same time they also argue for further investigation into the nature of measures' general factors, in particular with regards to the circumplex.

This current research extends their research on the nature of general factors by examining the general factor of a new measure, the Social Behavior Inventory. In addition, our investigation goes beyond simply determining underlying structure to examine the effects of removing such a general factor via ipsatization.

Across measures and researchers. Rationales for ipsatizing data are often based on the interpretation that the general factor is not relevant to research on interpersonal constructs, including interpersonal traits (e.g., being an agreeable person; Gurtman, 1994). These arguments are usually paired with a description of a general factor as simply a nuisance variable such as a response bias (Schmidt, Wagner, & Kiesler, 1999; Wagner, Kiesler, & Schmidt, 1995), stylistic tendencies of responding (Gurtman, 1994), and an intensity factor or another response format factor (Wiggins et al., 1981; Wiggins & Trobst, 1997). Two types of response biases specifically discussed in the literature are acquiescence, which refers to how much people say "yes" to all items being asked about (e.g., Wagner & Kiesler, 1995; Hofstee, Ten Berge, & Hendriks, 1998), and social desirability, which refers to being swayed to match one's responses to what is valued by societal norms (e.g., Jackson & Helmes, 1979; Sabourin et al., 1989)[2].

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[2] Paulhus and John (1998) posit that there are two types of biases at play, namely an egoistic bias that leads people to see themselves as being unrealistically dominant or

When a general factor is a response bias of the person completing the ratings, it means that the general factor is a measure of an aspect of the rater, other than what the measure is trying to assess (e.g., actual behaviour occurring, value being held or trait possessed). If researchers are interested in how people complete interpersonal measures then this variable would be important, otherwise it would be considered a nuisance variable that provides no information about the interpersonal characteristic being studied.

Overall, such interpretations of a general factor suggest a construct that is at best neither harmful nor useful, and at worst complicating data through the inclusion of irrelevant biases. With such interpretations, the removal of a general factor is a reasonable process, especially given the benefit of having theoretically sound data from which to draw conclusions. However, this view of a general factor as nuisance variable is not the only potential interpretation, particularly as the meaning of a general factor is not restricted to the same meaning across measures. As demonstrated by the research on the IIP-C, a general factor can have a substantive meaning of potential importance and implications for interpretation of data across levels of that factor, even though a general factor in other interpersonal measures is deemed non-substantive. This possibility further indicates the importance of considering each measure's general factor for its individual meaning, as it cannot simply be assumed to be a nuisance factor.

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intellectual, and a moralistic bias with a tendency to see oneself as unrealistically dutiful and agreeable. Importantly, both these two types of biases and Jackson's social desirability bias posit that dominance is valued more than submissiveness and friendliness more than unfriendliness.

Social Behavior Inventory. The original Social Behavior Inventory (SBI; Moskowitz, 1994) is a measure assessing how many times a person has done various interpersonal behaviours by having participants indicate with a checkmark each behaviour done during their last interaction. Based on this methodology, the original SBI's general factor was considered by Moskowitz to represent individual differences in people's frequency of checking (i.e., how often they made checkmarks). This exact interpretation could not be carried over to a newer Likert-scale version of the same measure utilized in research on dyadic interpersonal behaviour (e.g., Sadler & Woody, 2003). It is possible that the Likert-scale SBI's general factor similarly represents participants' willingness to indicate higher frequencies of behaviour by selecting "very often" or "almost always" on the scale across a lot of items. However, it is not necessarily wise to assume that this interpretation is correct for this new measure. The two general types of interpretations, namely nuisance response bias or substantive relevant variable, were explored in the form of three distinct constructs that were hypothesized to be the meaning of the general factor in the Likert-scale version of the Social Behavior Inventory. Thus in Study 1, the expected SBI general factor was predicted to have one of these three hypothesized meaings, namely acquiescence, social desirability, or engagement. The literature on other measures supports interpretations that the SBI general factor is a nuisance variable such as acquiescence or social desirability. However, it is possible for the SBI general factor to possess a substantive meaning (as the IIP-C does) that is unique to its focus on interpersonal behaviour, such as the concept of engagement, which was proposed as a potential substantive interpretation.

Through our exploration of the effects of ipsatization on the meaning and structure of data with a specific focus on the SBI general factor, we aimed to critically examine the continuing assumptions about the structure of interpersonal data and the role of ipsatization as the beneficial fixer of data by removing a general factor. As the nature of the Social Behavior Inventory's general factor cannot be assumed a priori, in Study 1 we investigated the three specific interpretations for an underlying general factor. This study involves a previously published unique dataset that involves both self-reported and observer-reported SBI ratings of people's behaviour after they interacted with another person for 20 minutes (Sadler & Woody, 2003). In addition, we conducted exploratory factor analyses to analyze these ratings as well as self-reported trait SBI data collected as part of the same study, to test the assumption that a general factor appears in this measure's data.

In Study 2, we replicated the factor structure of self-reported trait SBI data in two larger datasets, and explored the effects of ipsatization on both the underlying factor structure and pattern of correlations within these datasets. Since the removal of a measure's general factor has been posited as the mechanism by which ipsatization works (e.g., Gurtman, 1994), prior literature would expect ipsatization not to work on data that does not possess a general factor. By focusing on the previously unexplored general factor of the Likert-scale version of the Social Behavior Inventory, the insights from these two studies provide an in-depth look at this measure, as well as broader implications for ipsatization in general.

Study 1

Given that ipsatization is posited to remove a general factor, this process would be expected to remove the meaning and explanatory ability of the concept represented by that general factor. In the case of the IIP-C, ipsatization could potentially remove its general factor, which has been labeled overall level of distress expressed, from subsequent analyses. Many of the meanings of a general factor discussed above would not be problematic to remove, as response biases are rarely deemed as interesting in most research; however, concepts such as overall level of distress or engagement in the interaction may themselves be useful predictors or moderators. Thus the question arises regarding whether ipsatization removes concepts from the data that may be important when examining potential variables and models in interpersonal research.

We chose to examine the meaning of a general factor and the effect of removing this factor via ipsatization for the Social Behavior Inventory, which is a commonly utilized interpersonal measure of interpersonal behaviour. This measure consists of items arranged in four sub-scales that correspond to the four poles of the circumplex. The sub-scales for the poles of the dominance dimension are labeled with the commonly used terms of dominant and submissive. For the affiliation dimension's polar sub-scales, Moskowitz uses labels unique to this measure, namely agreeable and quarrelsome to represent the friendly and unfriendly poles, respectively.

Potential Meanings of the SBI General Factor

The first meaning, acquiescence, is one of the nuisance response bias interpretations that specifies that the more an individual is influenced by this response bias, then the more that person would rate all items highly, agree with them and see them

as applying to himself or herself (e.g., Wagner & Kiesler, 1995). The end result for the data is higher ratings for all items than would occur based solely on the reality of the characteristics being assessed. The nature of the item does not change the effect of this bias; for example, smiling and criticizing would be equally likely to garner the same amount of increase in ratings due to having an acquiescence bias (compared to not being biased).

The second nuisance response bias interpretation considered, social desirability, represents the degree to which people rate appealing items higher and unappealing items lower (e.g., Jackson & Helmes, 1979). Similar to acquiescence, social desirability is an aspect of the rater, influencing their ratings across all items. Unlike acquiescence, however, the direction of the effect for a social desirability response bias varies from item to item, or polar sub-scale to polar sub-scale. Some types of items, such as those on the dominant or friendly poles, are considered to be appealing by society[3], and as such would be rated highly by a person with a high social desirability response bias. For example, such a person would rate "I smile and laugh with others" highly, as it is considered by societal norms to be a good behaviour. In contrast, some types of items, such as those on the submissive or unfriendly poles, are considered unappealing by society, and as such would be rated lower than appealing items by a person with a high social desirability

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[3] Although we selected these sub-scales based on prior literature that categorized interpersonal sub-scales as appealing or unappealing (Jackson & Helmes, 1979) with a similar population (of southern Ontario university students), it is possible that cultural differences could exist in what behaviours people find appealing.

response bias. For example, such a person would rate "I criticize others" lower than "I smile and laugh with others" as it is considered to be a bad behaviour that should rarely be done.

Unlike the previous two interpretations, the third meaning, engagement, is not a response bias. Rather, it is proposed to be an aspect of the behaviour being rated by the SBI, namely the degree to which a person enacting the item being rated was engaged (Hoessler et al., 2007). To be considered engaged, a person needs to be actively interacting with and responding to the other person. Smiling, for instance, could be done in a disengaged manner such that it appears to be automatic rather than in response to the other person, and done for no interpersonal reason other than habit or passive acceptance of another presence. On the other hand, smiling could be done in a very engaged way that actively acknowledges the comments or feelings of the other person, changes to fit the situation and topic, and invites further conversation or interaction. In a similar way, the level of engagement is expected to be able to vary for all possible Social Behavior Inventory items, such that any item could be rated higher if the behaviour is done in an engaged way (or lower if it is not).

When ipsatization is performed, the underlying assumption is that what is removed from the data is less valuable than what is gained. Interpretation of the general factor as either an acquiescence bias or a social desirability bias allows for the removal of the general factor without much concern. Most prior literature, as discussed across several measures, suggests that a nuisance interpretation is most likely. In particular, Ten Berge (1999) suggests that when data possesses no single unifying construct across all items, then ipsatizing the data will remove variation due to "error of strategy" (i.e.,

response bias). By hypothesizing a response bias interpretation, the lack of a single construct across the SBI items is implied.

The finding of a substantive interpretation for the IIP-C's general factor lends support to the possibility that the SBI's general factor could have substantive meaning, such as engagement. By hypothesizing that there exists a meaningful main component, we would be sacrificing this component by ipsatizing (Ten Berge, 1999). If this measure's general factor is related to a relevant construct, then its removal may result in a loss of information that could be equal (or greater) than what is otherwise gained by ipsatization. Thus we hypothesized that the Social Behavior Inventory possesses a general factor in its data that corresponds to either a response bias or a substantive concept.

Method

Measures. The Social Behavior Inventory assesses how often people do different types of interpersonal behaviours. The questionnaire contains 46 behaviours listed as separate items that comprise four polar sub-scales. These sub-scales correspond to the endpoints of the two interpersonal dimensions of dominance and affiliation, and as previously discussed are labeled dominant, submissive, quarrelsome and agreeable. Each sub-scale consists of 12 items, with two items each counted twice as part of two scales.

As mentioned previously, the original SBI (Moskowitz, 1994) is an event-contingent measure that assesses participants' ratings of their own behaviour on a checklist containing 6 of the 46 items for each interaction they engage in. In contrast, the versions of the SBI utilized in this present research assess people's self-reported and

observer-reported behaviour for all 46 items, using a Likert-scale ranging from 1 (Never) to 6 (Almost Always).

The Sadler and Woody (2003) study contained three unique versions of the Likert-scale SBI that were expected to be related in different ways to the general factor for each potential meaning explored. A self-reported trait SBI measure indicated participants' general tendencies in behaviour during interpersonal interactions for the past month. A self-reported situational SBI measure asked people to indicate how often they did each behaviour during a specific interaction that had occurred a few minutes prior. Lastly, observers also rated participants' videotaped behaviour from the same interaction. These three measures differed slightly in their wording; for example, item 1 was worded as "I set goals for others" in the self-reported trait version, "I set goals for us" in the self-situational version, and "This person set goals for the other person or for both of them" in the observer-situational version. The full self-reported trait measure is included as Appendix A.

Overall, all versions of the Social Behavior Inventory gauge an individual's interpersonal behaviours during a specific interaction or interactions in general. Sadler and Woody (2003) reported good internal consistency reliabilities for all measures for both male and female participants (as the data was kept separate). Cronbach's alphas were between .62 and .78 for the self-reported trait and the self-situational measures, and between .88 to .97 for the observer-situational.

Dataset. Our investigation into the potential meanings of the expected general factor of the Likert-scale version of the Social Behavior Inventory utilized a dataset from Sadler and Woody (2003), where the three types of Likert-scale SBI ratings described

above were collected from undergraduate students at the University of Waterloo (N = 224). As part of mass-testing, self-reported trait SBI data was collected by asking participants to gauge their own behaviours over the last month in terms of all 46 items in the SBI. For the entire sample, participants were on average 19.51 years old (SD = 1.86).

Later in the year, these participants participated in a separately completed study. During the session, one male participant and one female participant who did not previously know each other came to the lab and were asked to work on a problem-solving task together. The material for the task consisted of several stories another person (not present in the session) created as part of a projective assessment in which she had been asked to describe what was occurring in each of several images. Each image consisted of a person or people in a scene. These images and her descriptions were provided to the interaction participants, who were instructed to determine together what the person's personality was, based on what she had written. The interaction lasted for 20 minutes and was videotaped.

After the interaction, the participants were asked to complete a set of measures, including SBI ratings of how they thought they had behaved during that interaction. The self-situational SBI measure contained 44 of the 46 items in the trait SBI measure. Two of the items, specifically item 19, "I asked for a volunteer" and item 30, "I gave incorrect information" were removed, as they were deemed to not fit with the context of the interaction. Later, several observers independently rated every participant on the 44 SBI items based on the participant's behaviour during the recorded interactions; these ratings were then averaged across observers to produce observer-situational SBI ratings.

Models of Potential Meanings of the SBI General Factor

Structural models of the three potential meanings of the SBI general factor were created to illustrate the differences between the meanings in terms of the predictions each has for self-report ratings and observer ratings. Sadler and Woody's (2003) study has the unique benefit of containing both people's ratings of their own behaviour during an interaction (self-situational ratings) and observer's ratings of the same behaviour (observer-situational ratings) for each person. As observers rated every participant, any response bias that the observers might have held would be constant across the data. Thus no relationship is expected between an acquiescence or a social desirability general factor and the sub-scale ratings made by observers. In contrast, the response bias of each participant would be uniquely reflected in that person's single set of ratings as represented by a relationship between the general factor and sub-scale ratings made by participants. This aspect of the study provided an excellent opportunity to compare the three meanings.

Each of the potential meanings of the general factor is represented by a model (shown in figure 2) as an underlying latent factor theorized to exist that possesses a unique pattern of relationships (as represented by the paths in the model) with the self-reported and observer-rated sub-scale scores that form observed variables from the study. Three factors are present in every model, specifically the two dimensional factors and the SBI general factor. In every model, the theorized general factor is represented in a circle at the bottom of each model, and the observed sub-scale scores are represented in rectangles in the middle of the models. The two dimensional factors, which are theoretical rather than observed variables, are also represented by circles at the top of the

model. These dimensional factors are predicted to be related (via the depicted paths) to the observed sub-scale variables.

The paths from the dimension factors (at the top of each model) are the same for all models, whereas the paths from the general factor differ across models based on which of the three interpretations are being modeled. Every model contains these same eight sub-scale variables composed of self-reported (labeled "Self") and observer's averaged ratings (labeled "Observer") for the four sub-scales. The "A", "Q", "D", "S" portions of the label indicate the SBI sub-scale represented, namely agreeable, quarrelsome, dominance and submissiveness respectively. Lastly, error terms were included in the models as advised by Kline (2005) when testing, but are not included in the relevant figures for ease of presentation.

In order to be able to compare these models directly to determine which best predicted the real ratings, we started by assigning hypothetical factor loadings to the paths between each factor and the observed variable. This approach allowed us to compute an expected correlation matrix for each model (described in the results section), which we could then compare to the obtained correlations. Our primary rationale in assigning the current factor loadings with different magnitudes for paths between different types of variables, was so that we could tell them apart in subsequent (tracing rule) calculations. The assignment of a magnitude of .7 to the dominance dimension's paths to the observed variables and .5 to the affiliation dimension's paths was consistent with their respective reliabilities (based on Sadler & Woody, 2003). Specifically, the dominance dimension measures tend to have higher reliabilities, enabling higher possible correlations with other variables than is possible for either the SBI general factor or the

affiliation dimensional factor. Based on this, the dominance dimension factor loadings were assigned weights of .7 magnitude.

In addition, the affiliation factor was expected to have lower reliabilities and thus smaller loadings (with a magnitude of .5). The effect of every potential interpretation of the general factor on self-ratings was expected to be of reasonable magnitude (and reliably measured), so the loadings were set to a magnitude of .6. Lastly, the paths representing the effect of the general factor on observer scores were assigned the lowest path loadings (with a magnitude of .4) because observers were expected to be less immersed in the situation and by rating each person separately may be less aware of the interplay (evocation of response) between participants.

A negative value on a path indicates a negative relationship between the construct represented by the factor (such as dominance) and what is measured by the observed variable (such as self-reported submissive behaviours). To illustrate, a negative value (-.7) was placed on the path between the dominance factor and the self-reported submissive behaviours sub-scale to represent the theorized negative relationship, with higher levels on the dominance dimension (by acting more dominant than submissive) being linked to lower frequencies of submissive behaviour being reported.

The absence of a path between a factor and an observed variable represents that a zero factor loading (or no relationship) is predicted. Such a lack of relationship occurs in the two models with either acquiescence or social desirability as the general factor, because these response biases are expected not to affect observers' ratings. Thus there are no paths drawn between the general factor (in the bottom circle) and the observer ratings (in the rectangles).

Acquiescence model. As a response bias of individual participants rating their own behaviour, acquiescence is only able to influence self-ratings. This influence is expected to be equal in direction and weight across the four sub-scales, as the nature of acquiescence leads to a higher rating regardless the item that would occur without bias. These characteristics are incorporated in the model as shown in Figure 2a, therefore .6 was assigned to all factor loadings depicting the relationship between the acquiescence general factor and each self-situational sub-scale.

Social desirability model. This response bias not only varies across participants and thereby influences self-ratings, but also depends on the type of item. If social desirability influenced self-ratings, agreeable and dominant behaviours, which are deemed appealing by societal norms, would be rated higher compared to unappealing quarrelsome and submissive behaviours (as shown in Figure 2b). Therefore .6 was assigned to the factor loadings depicting the relationship between the social desirability general factor and the agreeable and dominant self-situational sub-scales, and -.6 was the weight assigned to the paths between that general factor and the quarrelsome and submissive self-situational sub-scales.

Engagement model. As mentioned previously, how much a person interacts or responds to another person is a characteristic of the behaviour occurring, as acted or seen by oneself and observers alike. While participants may feel more immersed in the situation and notice their engagement more, as indicated by the higher assigned loadings, observers still witness how engaged a person is for each behaviour item. Thus in theory, all items and thus all sub-scales are expected to be open to variation in engagement as indicated in Figure 2c, therefore all factor loadings depicting the relationship between the

engagement general factor and each sub-scale were assigned a .6 for self-situational sub-scales, and .4 for observer-situational sub-scales.

Results

Testing models: Comparing actual and predicted correlations. Given a structural model with hypothesized weights or factor loadings on the paths from underlying factors to each variable, a predicted correlation matrix may be easily generated using the tracing rule (e.g., Kline, 2005). The tracing rule states that the predicted correlation between two variables is the sum of all associations between the two variables. The conceptual basis for this procedure includes an understanding that sub-scales (or any variables) that share the same underlying factor are related via that factor. If sub-scales have nothing in common (no shared factors) then they should not correlate, as is expected by theory for dominance and agreeableness, which share neither dimensional factor. When sub-scales do share a factor, such as a general factor, they are expected to correlate more, thereby reflecting their relation to each other via that factor. The strength and direction of the relationship via a factor is computed as the product of the relationship between each sub-scale variable and that factor (the product of the path loadings). If a variable does not have a path connecting it to a factor then that variable's part of the equation is zero with the product being zero (since 0 x other variable's path loading = 0). If both variables are not influenced by a factor then both have zero as their path loadings (since 0 x 0 = 0).

Thus for each model the correlation between all pairs of sub-scales were computed by adding together all of the possible relationships. For example, the correlation between dominance and submissive self-ratings in the acquiescence model (in Figure 2) would be equal to the sum of the relationship via the dominance factor (.7 x -.7)

and the relationship via the affiliation factor (0 x 0) and the relationship via the acquiescence factor (.6 x .6) for a total of -.13 (or -.49 + 0 +.36).

Each of the three models for acquiescence, social desirability and engagement, result in a unique predicted correlation matrix. These predicted correlations (in Table 4) were compared to actual correlations (in Table 5) from the Sadler and Woody (2003) dataset to begin to determine which model was the best predictor of actual responses.

Comparisons between the actual and predicted correlations for the models led to the conclusion that while portions of the actual correlations matched those predicted by the different models, no single model's predictions matched the actual data. For instance, the correlation between dominant self-ratings and submissive self-ratings (r = -.12 for males and r = -.21 for females) is best predicted by acquiescence and engagement. However, not all correlations are predicted equally by these two models. The correlation between submissive observer-ratings and agreeable observer-ratings (r = - .12 and r = - .15) is best predicted by engagement, whereas the correlation between agreeable observer-ratings and quarrelsome observer-ratings is best predicted by acquiescence and social desirability. Overall, each model predicted only some of the correlations with no model being much better than the other models.

Testing models: Confirmatory factor analyses. Using the AMOS program (version 16.0; Arbuckle, 2007), these models were drawn as structural equation models and tested for their fit with the data using confirmatory factor analyses. Due to the interdependencies between the data from males and females who made up the mixed-gender pairs in the interactions, male and female data were separately analyzed to determine model fit.

To create identified models, constraints were placed on each model. For all models, the regression weight on the paths from each error variable to its corresponding observed sub-scale variable was set to 1. The regression weights were set to 1 for all models on the path between the affiliation dimension factor and the observer's quarrelsome ratings variable, as well as on the path between the dominance dimension factor and the self-reported submissive ratings variable for all models[4]. Additional constraints were set to 1 or -1 on the pathways leading from the proposed general factor of each model based on the pattern hypothesized, with -1 set for paths modeled to have negative factor loadings and 1 set for paths modeled to have positive factor loadings. Specifically, for the acquiescence and engagement models all paths from those general factors were set to 1, whereas half of the social desirability paths were set to 1 (on paths to agreeable and dominance variables) and the other half to -1 (on paths to quarrelsome and submissive variables).

In general, none of these models fit the data well. The models representing acquiescence, social desirability and engagement fit poorly for males and for females (as shown in Table 6), with chi-squares indicating significant lack of fit, root mean square error of approximation (RMSEA) values well above .10 and comparative fit index (CFI)

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[4] Initial models had the constraint from the affiliation dimension on the path from that factor to the observer's agreeable ratings variable. However, when this social desirability model was tested on male's ratings the loadings would not converge (with a "minimization not successful" error).

values well below .90, all indicating poor fit according to the cutoffs listed by Kline (2005)[5].

One important feature of each model is that each assume that the factor structure underlying responses contained two dimensional factors and a general factor. While theoretically this structure is to be expected, it was unclear if it actually occurred in the SBI. Therefore, we decided to conduct a series of exploratory factor analyses to determine whether there were indeed three underlying factors in this data that were consistent with these expectations.

Testing assumptions: Exploratory factor analyses. To determine if the real nature of the SBI factor structure matched the theoretical one, several exploratory factor analyses using principal axis factoring were conducted on all three versions of the SBI in the 2003 dataset. Initial analyses determining the number of factors based on the eigenvalue-greater-than-one rule resulted in over-factoring with solutions containing 11 or 13 factors. These analyses included varimax rotations with 2-, 3-, 4-, and 5-factor solutions based on possible theory-based underlying structures containing dimension factors (2), dimensional factors plus a general factor (3), polar factors (4) or polar factors plus a general factor (5).

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[5] As confirmatory factor analyses fit statistics are omnibus tests that determine if the data fits the whole model, there exists the possibility that the data fits with some parts of the model just not all. To test whether both acquiescence and engagement factors are influencing ratings (since each of their correlations matched aspects of the data), we ran additional confirmatory factor analyses that also found a lack of model fit.

A comparison of the factor analysis solutions for self-situational SBI data indicated that both the 2-factor and 3-factor solutions appear to be good solutions based on the scree plot (in Figure 3a), as well as possessing clear patterns of high and unique rotated factor loadings (in Tables 7 and 8). Both patterns of factor loadings did not contain a general factor with all items loading highly and positively. The patterns were also not consistent with the dimensional or polar factors predicted. Instead the factors appeared to represent constructs that fall between the usual dimensions or only represent a single pole.

In the 2-factor solution, the first factor appeared as an "extraversion" factor (with high loadings for agreeable and dominant sub-scale items such as "I gave information"), and the second factor as an "inferred hostility" factor (with high loadings for the quarrelsome items and the "I did not" submissive items such as "I did not say what was on my mind"). Different factors appeared in the 3-factor solution, with a "leadership" factor as the first factor with high loadings on most dominant sub-scale items and negative loadings on submissive sub-scale items that referring to not being a leader (e.g., I avoided taking the lead or being responsible"). Unlike the extraversion factor, this "leadership" factor did not have high and unique loadings on agreeable sub-scale items, rather those items loaded onto the third "Friendly" factor. The middle factor appeared as a "inferred hostility" factor with a similar pattern of loadings as in the 2-factor solution.

Similarly the observer-situational versions also had a scree plot (in Figure 3b) and rotated factor loadings (Tables 9 and 10) supporting both the 2-factor and 3-factor solutions as reasonable solutions with no general factor nor dimensional or polar factors present. The factors in the 2-factor solution were the same (just different order) as those

in the self-situational version. However, the factors in the 3-factor solution appeared to be slightly different with an "extraversion" factor (with high loadings for agreeable and dominant sub-scale items such as "I expressed an opinion") like the one in the two factor solution, a "disagreeable" factor (with high loadings for some dominant sub-scale items and most of the quarrelsome sub-scale items such as "I criticized others") and a "follower" factor (with high loadings for submissive sub-scale items in particular "I avoided taking the lead or being responsible").

Factor analyses of the trait version of the SBI showed the 3-factor solution to be the best solution, as indicated by the scree plot (in figure 3c) and the rotated factor loadings (in Table 11). The trait SBI solutions also did not contain either a general factor or dimensional factors. The items' factor loadings for the trait version (as shown in Table 11) indicated that similar to the other two SBI versions, the trait SBI data contained an "extraversion factor" as one of its factors. This third factor (that accounts for 8.47% of the variance in items) had high loadings for agreeable and dominant sub-scale items including items such as "I complimented or praised others". For the second factor (9.34%), items from submissive sub-scale load highly on this "lack of behaviour" factor characterized by high loadings on items describing what one did not do or say such as "I did not say what was on my mind". The first factor (9.81%) was labeled "disagreeable" as it showed high loadings for items from the quarrelsome and dominant sub-scales, such as "I demanded others do what I wanted" and "I discredited what someone said". With a single best solution, the trait version of the SBI from this dataset provides a good dataset to examine the underlying structure of the SBI. Such self-reported trait measures are also

the most frequently examined in the literature (e.g., Tracey et al., 1996), thereby allowing for cross-measure discussion.

Overall, for all three SBI versions there was no factor upon which all items load highly and positively. Thus none of the extracted factors in the unrotated solution (nor the rotated solution) were consistent with a general factor. In addition, the patterns of factor loadings for SBI items in the 2-factor and 3-factor were unexpected with the placement of SBI items across the factors neither matching the two theorized dimensions (i.e., dominant and submissive items on one factor, and quarrelsome and agreeableness items on another factor) nor the possible polar dimensions (of dominant, submissive, agreeable and quarrelsome items each on their own factor). Thus, the Likert-scale SBI appeared to likely have a 3-factor structure with neither a general factor nor the two expected dimensional factors.

Overall, exploratory factor analyses of the two situational versions of the SBI suggested either a 2- or 3-factor solution, while the trait data indicated a 3-factor solution. Importantly, in all three analyses the results did not fit with expectations of two factors based on dominance and affiliation, and a third general factor. This dataset, however, contained a relatively small sample size of 224 people, which is less than the minimum sample size (or borderline at best) recommended for an exploratory factor analysis with 46 items, using the rule of thumb of at least 5 people per variable (Zwick & Velicer, 1996). Thus to determine with more certainty the underlying factor structure for the Likert-scale Social Behavior Inventory, including potential meanings of the factors, replication is needed using larger datasets.

Study 2

Our second study was aimed at two goals: firstly, to replicate the findings in Study 1 indicating a 3-factor structure, and secondly, to further expand on these findings by examining the effects of ipsatization on the data's underlying structure. Both of these sets of analyses utilized self-reported trait data, based on the clarity of the structure in the 2003 dataset and the growing literature discussing structure in other self-reported measures (e.g., Tracey et al., 1996).

The first question examined in this study was whether the 3-factor solution with no general factor that we found in the 2003 dataset can be replicated in larger datasets. These two self-reported trait SBI datasets were examined utilizing exploratory factor analyses in our first set of analyses in this study. With these same two datasets we also asked the second question of whether ipsatization can still produce a two dimensional structure in a measure with data that has this structure (including no general factor). The nature of the data's underlying structure before and after ipsatization was compared utilizing two methods, specifically the factors found via exploratory factor analyses and the intercorrelation matrix indicating the relationships between the sub-scales. Together these two analyses to address the second question provide complementary evidence in the last two sections to determine the structural changes in the data due to ipsatization.

Data

Two larger datasets were utilized to investigate these two questions in the Likert-scale version of the Social Behavior Inventory. The 2005 dataset was from the Fall 2005 mass-testing session at Wilfrid Laurier University that collected first- and second-year students' self-reported trait SBI ratings. Our sample ($N = 1106$) consisted of 799 female

and 307 males students who were on average 18.59 years old (SD = 1.83) of which 85.8 percent were first-year students, 88.8 percent were born in Canada, and 85.4 percent selected "White" as their ethnicity. The second larger dataset is a new 2007 dataset containing SBI data from Fall 2007 (N = 820) mass-testing sessions conducted at Wilfrid Laurier University on the same demographic.

Analyses and Results

Replication of Exploratory Factor Analyses. Our previous analysis of the 2003 dataset indicated a lack of a general factor in all three versions of the SBI examined, namely self-situational, observer-situational and trait. Specifically the exploratory factor analyses of the two situational SBI measures left the number of factors in the underlying structure unclear, while the trait data indicated a 3-factor solution. To determine whether the 3-factor structure without a general factor that was found in the 2003 dataset can be replicated in larger datasets, exploratory factor analyses were conducted on both the 2005 and 2007 datasets. Factor analyses with all factors with an eigenvalue greater than one (such that they account for more variance than an original item) were completed, as well as factor analyses with solutions constrained to 2-, 3- or 4-factor solutions.

These exploratory factor analyses were done with both varimax (i.e., constrained to be orthogonal) and promax (where factors are allowed to correlate) rotations. The resulting patterns were very similar in all solutions; thus, in further discussion only the varimax rotated solutions will be presented. The analyses using the eigenvalue-greater-than-one rule resulted in solutions that greatly over-factored with 8 factors being extracted for the 2005 dataset and 10 factors for the 2007 dataset. Over-factoring is a well-known problem when applying this rule. Thus determination of the number of

factors was primarily based on the scree plot and comparison of 2-, 3-, and 4-factors solutions. In order to determine if the 3-factor solution in the 2003 dataset was also the best solution in this larger dataset, a factor analysis with the solution constrained to 3 factors was computed. As it is common to compare the solutions with one less and one more factor than the expected solution, the 2- and 4-factor solutions were also examined.

In the 2005 dataset, the scree plot showed up to four factors above the scree, with the fourth very close to the remaining "rubble" (See Figure 4a). None of the unrotated factors had high and positive loadings for all items, replicating the finding from the 2003 dataset of no general factor in SBI trait data. The 2-factor solution contained what appeared to be a behaviour factor with dominance, quarrelsome and agreeable items and a lack of behaviour factor with the submissive items accounting for 13.55% and 10.26% of the variance respectively. This lack of behaviour factor is composed of items, which are "did not" items (e.g., item 36: I did not say how I felt), and items that imply less than what might have been done (e.g., item 20: I gave in, which implies that the person could have fought but did not).

Similar to in the 2003 dataset there were extraversion, lack of behaviour and disagreeable factors in the 2005 data (as shown in Table 12). For the first factor in the 2005 data, items in the 3-factor solution (that accounted for 10.97% of the variance in the data) with high and unique loadings for agreeable and dominant sub-scale items, such as "I complimented and praised others". The second factor (accounting for10.20%) was a lack of behaviour factor with high loadings for submissive sub-scale items, in particular the "I did not" factors such as "I did not say what was on my mind". The third factor (with 8.60%) was the disagreeable factor possessing high loadings for quarrelsome and

dominant sub-scale items, such as "I raised my voice". The 4-factor solution had these same three factors with the addition of a fourth bossy-leadership factor that included assigning someone to a task (item 43), which accounted for 10.20%, 10.07%, 7.14%, and 5.10% of the variance respectively. In comparing these solutions for the 2005 dataset, the 3-factor solution appeared to be the best solution with the most interpretable pattern of loadings.

In the 2007 dataset, the scree plot supported interpretations of a 2-, 3- or 4-factored structure with four factors above the rubble (see Figure 4b). The 2007 2-factor solution showed a similar pattern to the 2005 data with a factor with agreeable, dominance and quarrelsome items loading for the first factor (11.27%) and a lack of behaviour factor for factor 2 (9.62%). However, quarrelsome items were more split across the two factors, and had a unique loading on the lack of behaviour factor for item 4 ("I did not respond to another's questions or comments").

The 3-factor solution (shown in Table 13) contained the same factors as in the 2003 and 2005 trait SBI datasets, with the exception of factor order. In the 2007 data, the factors were lack of behaviour (11.41%), extraversion (9.69%), and disagreeable (5.38%); in comparison, the 2005 data had a flipped order for the first two factors with extraversion, lack of behaviour and disagreeable. The patterns of unique and high loadings were otherwise very similar between the two datasets.

The 4-factor solution contained the same lack of behaviour factor (11.48%), but for the remaining factors where the dominance items loaded had shifted. Instead of having extraversion and disagreeable factors, there was an agreeable factor (9.74%), a hostile factor (7.50%) with quarrelsome items, and a fourth factor where the highest and

the lowest loadings existed for items on the dominant sub-scale (5.12%). Thus the clearest pattern with the most unique and high loadings was the 3-factor solution.

Overall, across both datasets the clearest pattern with the most high and unique loadings existed in the 3-factor solutions, thereby replicating the pattern found for the 2003 trait data. In all three datasets, the 3-factor solution contained an extraversion factor, a disagreeable factor and a lack of behaviour factor, although the exact order of these factors (and proportion of variance accounted for by each factor) varied across data sets. Further replicating 2003 data, in all unrotated and rotated solutions, the factors did not fit the expected two dimensional structure and there was no general factor.

The lack of a general factor has implications for the process of ipsatization, which assumes the presence of such a factor. This factor appears essential to the interpretation that ipsatization reveals the true structure of the data by removing the measure's general factor to reveal the theorized two dimensions of dominance and affiliation. However, in the Social Behavior Inventory there appears to be no general factor to remove.

Comparison of Raw and Ipsatized Exploratory Factor Analyses. Recall that according to interpersonal theory, polar sub-scales representing dominant, agreeable, submissive and quarrelsome behaviours should align themselves within a 2-factor structure with dominance and affiliation as the two dimensions. Therefore correlations between these sub-scales based on this structure are expected to be negative between poles at opposite ends of the same dimension and zero between poles on different dimensions. This second part of this study aims to determine whether ipsatization can still achieve these expected correlations and structure in a measure without a general factor.

Exploration of the impact of ipsatization on the interpretability of the SBI factor structure and correlations involved comparing the non-ipsatized and ipsatized data for the 2005 and 2007 datasets. The factor analyses being compared included rotated solutions with 2-, 3- and 4-factors, as well as solutions containing factors with an eigenvalue greater than one[6].

The factor solutions using the eigenvalue-greater-than-one rule again over-factored with 11 factors for 2005 dataset and 12 factors for the 2007 dataset, so determination of the number of factors for the ipsatized scores was done primarily based on scree plots and comparison between the factor solutions. The most likely solutions were expected to be a 3-factor solution that leaves the raw 3-factor solution unchanged, and a 2-factor solution based on the two-dimension circumplex structure that is expected to be revealed by ipsatization (e.g., Gurtman, 1994). As the usual procedure involves examining solutions with 1 factor less (and 1 factor more) than what is expected. Thus 1-, 2-, 3-, and 4-factor solutions were compared.

In the 2005 dataset, the scree plot of the ipsatized data (in Figure 5a) showed the third and fourth factor close to the rubble, thereby supporting a 2-factor solution. This solution (as shown in Table 14) contained as its two factors a dominance factor upon which submissive items loaded negatively and dominant items loaded positively as the first factor (accounting for 13.20% of the variance in the items), and an affiliation factor as the second factor (8.00%) with agreeable items loading positively and quarrelsome

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[6] Varimax solutions were examined and presented, as varimax and promax rotations again showed very similar patterns.

items loading negatively (even if not uniquely). Other solutions contained less theoretically based factor structures[7]. Thus, the 2-factor solution, containing dimensional factors, was the clearest solution.

These patterns were similar to the scree plot loadings for the 2007 dataset. The 2007 scree plot also indicated 2 factors (as shown in Figure 5b), with the 2-factor solution (in Table 15) containing a dominance factor as the first factor (11.22%). The second factor was also similar in terms of unique loadings, although the direction of the loadings was opposite, with the second factor for the 2007 data resembling an "opposite of affiliation" factor. A simple transformation of multiplying the scores by -1 would result in a factor identical to 2005 data[8]. Thus a 2-factor solution was again the most interpretable and best solution of ipsatized data.

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[7] When the solution was constrained to 3 factors, dominance and quarrelsome sub-scale items moved to a third bossy factor (3.61%), thereby leaving the first two factors reduced to a behaviour factor with negative loadings for submissive sub-scale items (12.74%) and agreeable factor with only agreeable sub-scale items loading uniquely. Constraining the solution to a single factor (14.08%) resulted in all items being characterized by the same dominance factor that was the first factor in the 2-factor solution.

[8] The first factor of this 2-factor solution would be split into two factors in the 3-factor solution, resulting in the same behaviour factor (10.36%) and bossy factor (4.17%) as in the 2005 dataset. Unlike the 2005 dataset, the 2007 data retained the second factor (affiliation) of the 2-factor solution (7.10%). The 1-factor solution contains just the first

Overall, the underlying structure for the raw Likert-scale SBI data appears to be three factors, namely lack of behaviour, extraversion and disagreeableness, whereas ipsatizing the data results in a two factor structure that fits the theorized two dimensions of the circumplex (dominance and affiliation).

Comparison of Raw and Ipsatized Polar Sub-scale Correlations. The expected pattern for a sub-scale correlation matrix, as shown in Table 1, has negative correlations between the dominance and submissiveness poles, as well as between the agreeable and quarrelsome poles, and near-zero values for the remaining correlations between poles.

Intercorrelations between the four sub-scales were computed based on the raw and ipsatized scores. In comparisons of the raw and ipsatized correlations, the same pattern arose in both the 2005 and 2007 datasets. As shown in Table 16, the correlations between polar sub-scales at opposite ends of the same dimension that were much smaller than expected when based on raw scores, became strongly negative when ipsatized, thereby fitting with what theory expects. For example, the correlations between the dominant and submissive sub-scales shift from roughly $r = -.19$ to $r = -.80$ when the data was ipsatized. In addition, the correlations between sub-scales on different dimensions, which were more positively correlated than expected for raw scores, shift in a negative direction to become more negative than expected for the submissive sub-scale correlations, and near-zero for the dominant sub-scale correlations.

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factor of the 2-factor solution (11.82%), without any of the ability to account for variance due to the other aspects.

Thus after ipsatization the pattern of sub-scale correlations, which did not originally fit theory, fits the pattern expected with strongly negative correlations for polar sub-scales on opposite ends of the same dimension and roughly zero correlations between polar sub-scales on different dimensions. Overall, ipsatizing SBI data appears to result in the desired structure and correlations predicted by theory even though there is no general factor in this data.

Discussion

Statistical procedures that aim to unmask a two dimensional structure in interpersonal data in order to match theoretical expectations can indeed achieve this structure; however, an empirically-based understanding of the procedure and the characteristics of the data is needed. Specifically, it is important to determine if any hidden costs exist, such as the removal of theoretically relevant or useful information, and whether previously unexplored assumptions, such as requirements and the mechanism by which it transforms the data, are valid. In this research, an initial exploration into the potential cost of ipsatization, in terms of the potential loss of information, led to an investigation into assumptions about the measure's structure and the previously assumed requirement of ipsatization.

Study 1 found that data from the Likert-scale Social Behavior Inventory possesses a three-factor structure containing neither a general factor nor factors corresponding to the circumplex's two dimensions. Study 2 replicated this structure in two larger datasets, and furthered research on ipsatization by determining that even data possessing this structure of three factors with no general factor can still be ipsatized to produce the theoretically expected structure with two dimensional factors.

Thus our findings regarding the underlying structure of the Likert-scale Social Behavior Inventory, based on several datasets, indicate that not all interpersonal measures possess the expected structure of a general factor and two dimensional factors. The assumption that this structure exists within data is a requirement for describing ipsatization as a process that removes this general factor in order to reveal more clearly the two dimensional factors in line with interpersonal theory. While ipsatization still created the desired two dimensional factor structure with a dominance and an affiliation factor, the lack of a general factor in the raw data suggests that the mechanism cannot be removing a general factor as has been previously assumed. Thus further research is needed to more deeply understand the structure underlying (raw) interpersonal data and the effect of ipsatization on this structure that results in the desired structure.

While focusing specifically on the Likert-scale version of the Social Behavior Inventory allowed for an in-depth look at this phenomenon, our findings are restricted due to this narrow focus. The structure of this measure, including the information that it does not possess a general factor, is specific to the instrument in the same way that reliability of a measure is specific to that instrument and cannot be generalized to other measures. This restriction holds for other research on general factors, such as the previously mentioned findings that the IIP-C possesses a general factor with a meaning tied to overall distress expressed by those filling out the measure (Tracey et al., 1996). In the same way, our results are about a specific measure, the Likert-scale version of the Social Behavior Inventory, including the finding that this measure lacks a general factor. However, based on the findings of our study for this single measure, the generalized assumption about the underlying structure of every interpersonal measure can be

disproved in the same way that a single case can disprove a principle. Furthermore, based on the finding that ipsatization still produces the expected two dimensional structure from this three-factored data with no general factor, a general factor cannot be the mechanism by which ipsatization improves the correlations and factor structure patterns of data in every interpersonal measure.

Also generalizable from this study are our methods of investigation into the effects of ipsatization by comparing factor structure and correlations between raw and ipsatized data. The factor structure we found in terms of factor loading patterns can also be used for replication testing in other measures.

The use of a correlation matrix as the basis of the factor analyses is a potential limitation; this conventional method is prone to generating additional factors that are not substantive and makes an assumption that the variable being analyzed is continuous. In order to address the first issue of over-factoring, O'Connor (2000) suggests utilizing parallel analyses to determine the number of factors contained in the data based on how many factors that random chance alone could generate. However, this procedure could only be done at the item-level with a polychoric correlation matrix. Polychoric correlations are utilized to access the relationships between the variables underlying the data when the data itself may be non-continuous. Through polychoric correlations, ordered variables in datasets can be used to estimate the correlation existing between the assumed underlying continuous variables, thereby allowing for analyses to be performed on the data as if it is continuous. Such analyses are not available using the available SPSS or AMOS statistical programs; however polychoric correlations can be generated using LISREL or SAS.

Future research on interpersonal measures could compare the factor structure generated by these different methods by utilizing both correlation matrix factor analyses completed in our research and the polychoric correlations with parallel analysis suggested by O'Connor (2000). However, this other method has its own relative weakness of requiring very large sample sizes. Also, the lack of research utilizing this method limits knowledge of additional weaknesses of this method (E. Woody, personal communication, May 12, 2008).

The second issue of assuming continuous data is problematic for many Likert-based scales; however, this potential barrier may not be a problem for the SBI. Although Likert-scale responses are not necessarily continuous or even ordinal (such as people selecting 1 *yes*, 2 *no,* or 3 *not applicable*), the Likert-scale Social Behavior Inventory can be interpreted as continuous (i.e., ratio). By asking how frequently a person does each behaviour listed on a scale of *Never* (1), *Rarely* (2), *Occasionally* (3), *Often* (4), *Very Often* (5), and *Almost Always* (6), this scale has without question labeled values, and a natural order of magnitude (Myers & Hansen, 2002). It can further be argued that the scale has similarly spaced intervals, and a true zero to some degree (in the value *Never*) whereby a frequency of *Often* (which is the distance from *Rarely* to *Often*) is twice the frequency of *Occasionally* (which is the distance from *Rarely* to *Occasionally*). The numbers associated with each label further reinforce the continuous nature of this evaluation for the students who are responding to the question. Thus Likert-scale SBI data could potentially be treated as continuous without problems; future research could empirically examine the nature of this scale.

Having an item-level of analysis is also another possible concern for our study, based on Bernstein's (1988) arguments that the factors found may be due to mathematical differences in item means that result in clustering based on the level of response (such as difficulty of task or frequency of behaviour) rather than substantive categories. While mathematical differences in means were found between some of the factors (e.g., the mean for items on factor 1 was higher than for factor 2 in the 2005 ipsatized data), this does not entail that means were the only basis of clustering. Although the average amount of dominance and affiliation behaviours people report do differ, these constructs likely also differ for other reasons as well, such as the distinct nature of behaviours aimed at agentic and communal goals. For example, people in general, based on social norms, may tend to report their leadership behaviours more often than how friendly they are; yet even if people as a whole group were to report each behaviour type equally, it is likely that they would cluster for substantive reasons as well. Specifically, such clusters may occur based on individual-level differences that result in grouping the items into dominant and submissive behaviours, as well as agreeable and quarrelsome behaviours.

To address the concerns about item-level analyses, O'Conner (2000) suggests creating "testlets" rather than utilizing individual items, and examining the relationships between them. As part of our analyses, intercorrelations of the polar sub-scales were examined. These SBI sub-scales provided natural testlets with which to test the relationships between substantive-based testlets of items. The relationships found between sub-scales clearly indicate the two dimensions in the ipsatized data with a correlation pattern (in Table 16) approximating the theoretically expected pattern (shown in Table 1). A more complex structure appears in the unipsatized data (in Table 16). High

correlations between the dominant sub-scale and each of the agreeable and quarrelsome sub-scales fit with an extraversion factor and a disagreeable factor. In addition, the submissive sub-scale had low correlations with the other three sub-scales matching the pattern that would be expected for factor structure with a separate factor containing mostly submissive items. Thus utilizing testlets as suggested by O'Conner supports the factor analyses showing a three factor structure with extraversion, disagreeable and lack of behaviour factors in unipsatized data, and a two factor structure with dominance and affiliation factors in ipsatized data.

While prior literature (such as Dunlap and Cornwell, 1994) has critiqued the act of factor analyzing ipsative scores based on the resulting bipolar factors that are "artifactual" and would mask any real relationships among the measures. Ten Berge (1999) directly addresses their critique noting that ipsatization is expected to alter the factor structure (so the changes is not problematic) and their methodology (including too many factors) is likely the reason for nonsensical factor structures. The nature of bipolar factors with their negative correlations is also specifically addressed by Ten Berge, who notes that in balanced measures with equal number of items opposing each other (as could be argued occurs between agreeable and quarrelsome items as well as dominant and submissive items) bipolar factors are not problematic nor artifactual. Thus our finding of bipolar factors are not problematic, despite Dunlap and Cornwell's critique, as they are expected based on the dimensions of the circumplex and thereby can be interpreted in a meaningful way. Furthermore, our research supports Ten Berge's response that bipolar factors are not inherently problematic, rather ipsatization can result in interpretable factors.

Lastly, our research calls into question one explanation for how ipsatization operates on the data to produce the expected structure, but falls short of providing a replacement understanding, with only a tentative beginning of an investigation into the mechanism by which ipsatization works upon interpersonal data. Based on aspects of the data and structure, three potential mechanisms were considered namely mathematical, methodological and conceptual.

Ipsatization might act then by making similar ratings into polar opposites by drawing the dividing line between somewhat and a lot in order to create end-point sub-scales. Mathematical patterns in the Likert-scale SBI data may be one potential focus of future research, as a brief examination of the data reveals that submissive and quarrelsome scores in the 2005 data fall below the mean, and dominant and agreeable scores above the mean. While it remains unclear how removing the mean from these scores produces a 2-factor rather than 1 factor structure, this pattern may explain why two dimensional rather than four polar factors are found. This explanation, like any other, requires further research to generate the understanding needed to knowledgeably utilize ipsatization to transform data. More specifically, future research into a mathematical explanation could test whether a purely mathematical based response pattern could produce a circumplex in similar analyses to those done by Jackson and Helmes (1979) for social desirability. In addition, researchers could alter items to produce lower (or higher) ratings than the original items in order to test if the changes resulted in a different structure.

The found structure could also have a methodological basis that is tied to the interesting point raised in the introduction regarding the proportion of variance lost

during ipsatization, in particular the differential amount removed from submissive sub-scales. Analyses completed on the 2003, 2005 and 2007 datasets reveal the same pattern of a lower proportion being removed from the submissive sub-scale compared to the other three sub-scales (see Appendix B). This difference suggests that there might be something unique about the submissiveness scale.

One possible interpretation is that some items are less engaged than other items. Conceptually, every type of behaviour can vary in levels of engagement, such that a person can be disengaged agreeable (e.g., smiling slightly from afar) or engaged agreeable (e.g., welcoming people warmly). Even disengaged dominance is possible, as would be the case when a bouncer stands without saying anything and watches. Similarly, submissive behaviours can be either engaged or disengaged, with engaged submissiveness occurring, for example, in a very attentive server. However, the items on the Likert-scale SBI appear not to show this range of engagement, with most disengaged behaviours being from a single sub-scale, namely the submissive sub-scale (as shown in Table 17)[9]. The four sub-scales might also vary as to how easily it is for people to label

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[9] Four people, including three naive people and myself who were available over one weekend, separately completed an initial categorization of these SBI items. An additional full pilot and a larger study were considered but not conducted. The instructions were "Please rate whether the item describes an Engaged behaviour, or a Disengaged behaviour" with the definitions as "Engaged: interacting with and responding to another person" and "Disengaged: not interacting with and not responding to another person". The categories in Table 17 reflect the amount of agreement for each item. Cohen's Kappa

their behaviours with the items, as some subscales such as quarrelsome or submissiveness may be comprised of potentially more socially unappealing or more intensely worded statements than the other subscales. Ipsatization might then operate due to this characteristics of the unrepresentative range of behaviours captured in the items as well as potentially other unbalanced characteristics across the subscales, rather than on well-represented concepts. In future research, a measure representing the full range of engagement for each sub-scale could be created. Exploration of such a measure could disentangle the submissive sub-scale from disengagement (of which both co-occur in the lack of behaviours factor), and determine if the three-factor structure found exists for a more balanced measure of interpersonal behaviour.

The structure's factors may indeed also be conceptually driven; however, it is possible that these meanings of the three factors in the underlying structure of raw data are concepts not based on the two dimensions of the circumplex. Two potential interpretations were considered during this research, with these and additional possibilities requiring future research to accurately label the factors. The first interpretation draws on constructs from personality research by envisioning two of the factors as representing extraversion and agreeableness as well as a factor representing a lack of behaviour. The second interpretation labels the three-factor structure based on

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scores for coder 3 were quite low (< .3) and as such that person's ratings were removed from the data presented. The Cohen's Kappa scores for the remaining three coders ranged from .65 to .84 ($ps < .001$), all of which are above a .6 cutoff.

Schutz's (1966) three factors of interpersonal behaviour that he conceptualized as control, inclusion and affection.

Regarding the first conceptual interpretation of the three factors being extraversion and agreeableness with a lack of behaviour factor, a review of the literature indicated that the extraversion and agreeableness factors of the Five-Factor Model (FFM; Costa &McCrae, 1992) have been frequently examined in relation to the dominance and affiliation dimensions of interpersonal measures, such as the revised Interpersonal Adjective Scales (IAS-R; Wiggins, Phillips, & Trapnell, 1989; Wiggins, Trapnell, & Phillips, 1988), IIP-C, and SBI. McCrae & Costa (1989) compared the IAS-R octants placements relative to the NEO-PI (Costa & McCrae, 1992). They found that NEO-PI extraversion lies at the octant halfway between IAS-R dominance and agreeableness dimensions of the circumplex, and NEO-PI agreeableness lies between the IAS-R agreeableness and submissive dimensions but closer to the agreeableness dimension than the submissive dimension. This placement of extraversion was different in research by Pincus & Gurtman (1995), who found NEO-PI extraversion to lie closer to the IAS-R and IIP dimensions of dominance. NEO-PI agreeableness continued to have the same placement on both the IAS-R and IIP circumplexes, as found before.

In early research, Moskowitz (1994) compared the placement of ipsatized SBI subscales to IAS-R subscales, indicating that the SBI dominant behaviour subscale appears to be situated not at IAS-R dominance but shifted slightly towards IAS-R agreeableness (similar to the placement of extraversion in the two studies above). The other three SBI subscales were situated as expected with each SBI subscale aligning with its IAS-R counterpart (e.g., SBI submissive behaviour subscale aligning with the IAS-R

submissive octant scale). This would suggest that the SBI dominant behaviour subscale is shifted enough to align more strongly with the NEO-PI extraversion than the IAS-R dominance octant did. Yet, when Côté & Moskowitz (1998) directly examined the placements of ipsatized SBI scores relative to the NEO-PI extraversion and agreeableness subscales, they found a different pattern. NEO-PI extraversion correlated significantly with the SBI agreeable behaviour subscale but not the dominant behaviour subscale that would be expected. NEO-PI agreeableness did correlate positively (although significant in only one of the two samples) with the SBI agreeable behaviour subscale, as would be expected, and negatively with the quarrelsome behaviour subscale.

This disparity in results for ipsatized SBI subscales for this original (non-Likert-scale) version of the SBI, as well as the lack of research on unipsatized data and in particular on Likert-scale SBI data would necessitate future research in order to test this interpretation of the three factors as extraversion, agreeableness and lack of behaviour. Such future research could examine people's ratings of both the Likert-scale SBI and the Extraversion and Agreeableness sub-scales of the NEO-PI for unipsatized data, in order to investigate the meaning of the three factors and ipsatized data and test the placement of the dominance and affiliation factors relative to other measures in past literature.

The second interpretation labels the three factors based on Schutz's (1966) control, inclusion and affection concepts. Potential methods of investigation include categorizing items based on these three constructs to determine if the items group in similar clusters as with the factor structure, and correlating the factors with octant scores from other measures (such as the Circumplex Scales of Interpersonal Values; Locke, 2000) to clarify the position of these factors within the circumplex. However, it is

challenging to create a coherent interpretation of Schutz's three constructs regarding how each construct would manifest in people's behaviour. Problems include having each type of behaviour being defined relative to the need it is satisfying in a somewhat vague circular description, and the later inconsistencies (or variations) in how each construct's behaviour is described subsequently, in particular when discussing types of interpersonal behaviours (deficiencies and extremes) and schemas.

In these conceptual interpretations of the factors, ipsatization might derive from these concepts a simpler (and smaller) set of concepts that can describe the nature of the data. This reduction of complexity in interpretation would indeed be desirable based on Occam's Razor. Future research could examine whether ipsatization really improves conceptual utility of the data. Specifically, after determining which concepts are associated with which factors, researchers could examine if the concepts differ between the pre-ipsatization three-factor structure and the post-ipsatization two-factor structure. If they do differ, another study might examine whether any concepts associated with the three-factor structure have predictive ability equal to (or less or more than) the concepts associated with the two-factor structure. For example, would people's extraversion in the 3-factor structure or dominance in the 2-factor structure be a better predictor of their interaction partner's behaviour (if these concepts were indeed represented by these factors).

In general, future research is needed to more deeply examine the structure of interpersonal measures, including the SBI, and to explore further the mechanism by which ipsatization changes these structures to produce two-dimensional factors in data with and without a general factor. While research into the transformation of data is

beneficial for identifying real (and incorrectly assumed) requirements, deeper understanding of how data is altered is necessary in order to be able to draw accurate conclusions on conceptual questions based on measured constructs.

In conclusion, we found the assumptions about ipsatization's mechanism and premises that previously stood untested are incorrect after empirical examination. Thus despite producing the expected factor structure, ipsatization's mechanisms and requirements are not those previously described in the literature as based on the general factor. The mechanism by which ipsatization works is unclear; however, ipsatization can transform data to result in an underlying structure that fits with the theorized circumplex, even when interpersonal data does not contain the expected general factor. So, to answer the question posed in the title, future researchers can ipsatize their data to produce the two-factor circumplex structure, but perhaps should not ipsatize until after consideration of what ipsatization might be doing to the data based on its structure. More broadly this research encourages further investigation of assumptions and mechanisms of data transformations that alter the data upon which nearly all empirical research draws conclusions about constructs such as interpersonal behaviours and values.

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Table 1

Sub-scale Correlations Expected Based on the Interpersonal Circumplex

	Dominant	Submissive	Friendly
Submissive	Strongly negative		
Friendly	0	0	
Unfriendly	0	0	Strongly negative

Table 2

Sub-scale Correlations that Actually Occur

	Dominant	Submissive	Friendly
Submissive	(-.19)		
Friendly	(.39)	(.13)	
Unfriendly	(.36)	(.19)	(.09)

Note. SBI ratings from Sadler (1997) dataset.

Table 3

Proportion of Variance Removed from SBI Sub-scales by Ipsatization

Sub-scale	Proportion
Dominant	.49
Submissive	.23
Agreeable	.54
Quarrelsome	.51

Note. SBI ratings from Sadler (1997) dataset.

Table 4

Predicted Correlations in the Sadler and Woody (2003) Dataset

Data	Correlations						
Acquiescence	Dself	Sself	Aself	Qself	Dobs	Sobs	Aobs
Dself							
Sself	-0.13						
Aself	0.36	0.36					
Qself	0.36	0.36	0.11				
Dobs	0.49	-0.49	0	0			
Sobs	-0.49	0.49	0	0	-0.49		
Aobs	0	0	0.25	-0.25	0	0	
Qobs	0	0	-0.25	0.25	0	0	-0.25
Social Desirability							
Dself							
Sself	-0.85						
Aself	0.36	-0.36					
Qself	-0.36	0.36	-0.61				
Dobs	0.49	-0.49	0	0			
Sobs	-0.49	0.49	0	0	-0.49		
Aobs	0	0	0.25	-0.25	0	0	
Qobs	0	0	-0.25	0.25	0	0	-0.25
Engagement							
Dself							
Sself	-0.13						
Aself	0.36	0.36					
Qself	0.36	0.36	0.11				
Dobs	0.49	-0.49	0	0			
Sobs	-0.49	0.49	0	0	-0.33		
Aobs	0	0	0.25	-0.25	0.16	0.16	
Qobs	0	0	-0.25	0.25	0.16	0.16	-0.09

Note. Dself = dominant self-situational ratings, Sself = submissive self-situational ratings, Aself = agreeable self-situational ratings, Qself = quarrelsome self-situational ratings,

Dobs = dominant observer-situational ratings, Sobs = submissive observer-situational ratings, Aobs = agreeable observer-situational ratings, and Qobs = quarrelsome observer-situational ratings.

Table 5

Actual Correlations in the Sadler and Woody (2003) Dataset

Data	Correlations						
Male	Dself	Sself	Aself	Qself	Dobs	Sobs	Aobs
Dself							
Sself	-0.17						
Aself	0.42	0.21					
Qself	0.44	0.15	0.13				
Dobs	0.51	-0.28	0.15	0.16			
Sobs	-0.50	0.28	-0.13	-0.13	-0.93		
Aobs	0.03	0.00	0.26	0.01	0.16	-0.12	
Qobs	0.14	-0.10	-0.11	0.24	0.26	-0.20	-0.51
Female							
Dself							
Sself	-0.21						
Aself	0.37	0.05					
Qself	0.26	0.23	0.03				
Dobs	0.41	-0.30	0.15	0.19			
Sobs	-0.35	0.35	-0.15	-0.17	-0.92		
Aobs	-0.10	-0.12	0.28	-0.14	0.13	-0.15	
Qobs	0.12	-0.11	-0.12	0.19	0.26	-0.18	-0.39

Note. Dself = dominant self-situational ratings, Sself = submissive self-situational ratings, Aself = agreeable self-situational ratings, Qself = quarrelsome self-situational ratings, Dobs = dominant observer-situational ratings, Sobs = submissive observer-situational ratings, Aobs = agreeable observer-situational ratings, and Qobs = quarrelsome observer-situational ratings, in the dataset with 112 females and 112 males.

Table 6

Confirmatory Factor Analyses Fit Statistics for the Models of Potential Meaning

Models	Chi-Square	RMSEA	CFI
Acquiescence			
Male	74.10*	.16*	.86
Female	67.38*	.15*	.85
Social desirability			
Male	103.63*	.20*	.78
Female	83.87*	.18*	.80
Engagement			
Male	90.47*	.18*	.82
Female	77.89*	.17*	.82

Note. Degrees of freedom for Chi-square tests was 19 for all models tested using the self-situational SBI and observer-situational SBI ratings in the Sadler and Woody (2003) dataset with 112 females and 112 males.

* $p < .001$

Table 7

2003 Dataset High Factor Loadings for SBI Self-Situational Items (2-Factor Solution)

	Factors in Solution	
	Factor 1 "extraversion"	Factor 2 "inferred hostility"
Initial eigenvalue	5.80	4.89
Variance accounted for by each rotated factor	11.54%	9.56%
Items by Sub-scale		
Agreeable		
3. I listened attentively to others.	.35	
20. (21.) I smiled and laughed with others.	.36	
24. (25.) I showed sympathy.	.31	
28. (29.) I exchanged pleasantries.	.43	
31. (33.) I pointed out to others where there was agreement.	.41	
43. (45.) I expressed reassurance.	.36	
Dominant		
1. I set goals for others.	.35	
5. I gave information.	.73	
8. I expressed an opinion.	.80	
15. I took the lead in planning/organizing a project or activity.	.59	
22. (23.) I spoke in a clear firm voice.	.55	
26. (27.) I asked others to do something.		.56
29. (31.) I got immediately to the point.	.39	
33. (35.) I tried to get others to do something else.		.61

37. (39.) I made suggestions.	.69	
41. (43.) I assigned someone to a task.		.54
Quarrelsome		
7. I criticized others.		.41
18. I demanded that others do what I wanted.		.56
21. (22.) I discredited what someone said.		.54
32. (34.) I stated strongly that I did not like or that I would not do something.		.35
36. (38.) I ignored another's comments.		.43
40. (42.) I withheld useful information.		.45
Submissive		
2. I waited for another person to act or talk first.	-.44	
9. I did not express disagreement when I thought it.		.39
19. (20.) I gave in.		.54
27. (28.) I did not say what I wanted directly.		.44
30. (32.) I did not state my own views.	-44	.39
34. (36.) I did not say how I felt.		.45
38. (40.) I avoided taking the lead or being responsible.	-.51	
42. (44.) I did not say what was on my mind.		.50

Note. Only loadings higher than .35 (or lower than -.35) are shown. Item numbers for the self-situational measure are different than the item numbers for the trait measure (as shown in brackets), because items 19 and items 30 of the trait measure were not included.

Table 8

2003 Dataset High Factor Loadings for SBI Self-Situational Items (3-Factor Solution)

	Factors in Varimax Rotated Solution		
	Factor 1 "leadership"	Factor 2 "inferred hostility"	Factor 3 "friendly"
Initial eigenvalue	5.80	4.89	2.87
Variance accounted for by each rotated factor	9.74%	9.48%	6.93%
Items by Sub-scale			
Agreeable			
3. I listened attentively to others.			.59
6. I went along with the views or wishes of another person.			.37
17. I complimented or praised others.			.43
20. (21.) I smiled and laughed with others.			.40
24. (25.) I showed sympathy.			.45
28. (29.) I exchanged pleasantries.			.44
31. (33.) I pointed out to others where there was agreement.			.51
35. (37.) I expressed affection with words or gestures.			.37
43. (45.) I expressed reassurance.			.53
Dominant			
5. I gave information.	.67		
8. I expressed an opinion.	.69		.41
15. I took the lead in planning/organizing a project or activity.	.61		
22. (23.) I spoke in a clear firm voice.	.48		

26. (27.) I asked others to do something.		.58	
33. (35.) I tried to get others to do something else.		.62	
37. (39.) I made suggestions.	.61		
41. (43.) I assigned someone to a task.		.55	
Quarrelsome			
7. I criticized others.		.43	
18. I demanded that others do what I wanted.		.57	
21. (22.) I discredited what someone said.		.56	
32. (34.) I stated strongly that I did not like or that I would not do something.		.35	
36. (38.) I ignored another's comments.		.49	-.40
40. (42.) I withheld useful information.		.42	
Submissive			
2. I waited for another person to act or talk first.	-.58		
9. I did not express disagreement when I thought it.		.38	
12. I spoke softly.	-.44		
19. (20.) I gave in.		.52	
27. (28.) I did not say what I wanted directly.		.40	
30. (32.) I did not state my own views.	-.48		
34. (36.) I did not say how I felt.		.41	
38. (40.) I avoided taking the lead or being responsible.	-.67		
42. (44.) I did not say what was on my mind.	-.40	.46	

Note. Only loadings higher than .35 (or lower than -.35) are shown. Item numbers for the self-situational measure are different than the item numbers for the trait measure (as shown in brackets), because items 19 and items 30 of the trait measure were not included.

Table 9

2003 Dataset High Factor Loadings for SBI Observer-Situational Items (2-Factor Solution)

	Factors in Solution	
	Factor 1 "inferred hostility"	Factor 2 "extraversion"
Initial eigenvalue	7.08	5.84
Variance accounted for by each rotated factor	14.23%	12.07%
Items by Sub-scale		
Agreeable		
3. I listened attentively to others.		.38
10. I spoke favourably of someone who was not present.		.36
13. I compromised about a decision.		.31
17. I complimented or praised others.		.54
20. (21.) I smiled and laughed with others.		.44
24. (25.) I showed sympathy.		.45
28. (29.) I exchanged pleasantries.		.35
31. (33.) I pointed out to others where there was agreement.		.56
35. (37.) I expressed affection with words or gestures.		.56
43. (45.) I expressed reassurance.		.56
Dominant		
1. I set goals for others.		.38
5. I gave information.		.71
8. I expressed an opinion.		.63

15. I took the lead in planning/organizing a project or activity.		.43
22. (23.) I spoke in a clear firm voice.		.48
26. (27.) I asked others to do something.	.40	
29. (31.) I got immediately to the point.		.41
33. (35.) I tried to get others to do something else.	.57	
37. (39.) I made suggestions.		.62
41. (43.) I assigned someone to a task.	.47	

Quarrelsome

4. I did not respond to another's questions or comments.	.36
7. I criticized others.	.62
18. I demanded that others do what I wanted.	.49
21. (22.) I discredited what someone said.	.58
25. (26.) I confronted others about something I did not like.	.44
32. (34.) I stated strongly that I did not like or that I would not do something.	.41
36. (38.) I ignored another's comments.	.47
40. (42.) I withheld useful information.	.61
44. (46.) I showed impatience.	.37

Submissive

2. I waited for another person to act or talk first.	.39
9. I did not express disagreement when I thought it.	.42
19. (20.) I gave in.	.62
23. (24.) I spoke only when I was spoken to.	.49
27. (28.) I did not say what I wanted directly.	.54
30. (32.) I did not state my own views.	.58
34. (36.) I did not say how I felt.	.70

38. (40.) I avoided taking the lead or being responsible.	.43
42. (44.) I did not say what was on my mind.	.67

Note. Only loadings higher than .35 (or lower than -.35) are shown. Item numbers for the observer-situational measure are different than the item numbers for the trait measure (as shown in brackets), because items 19 and items 30 of the trait measure were not included.

Table 10

2003 Dataset High Factor Loadings for SBI Observer -Situational Items (3-Factor Solution)

	Factors in Varimax Rotated Solution		
	Factor 1 "extraversion"	Factor 2 "disagreeable"	Factor 3 "follower"
Initial eigenvalue	7.08	5.84	2.97
Variance accounted for by each rotated factor	11.05%	11.02%	9.74%
Items by Sub-scale			
Agreeable			
3. I listened attentively to others.	.55		
6. I went along with the views or wishes of another person.	.41		
13. I compromised about a decision.	.36		
17. I complimented or praised others.	.54		
20. (21.) I smiled and laughed with others.	.47		
24. (25.) I showed sympathy.	.47		
28. (29.) I exchanged pleasantries.	.40		
31. (33.) I pointed out to others where there was agreement.	.57		
35. (37.) I expressed affection with words or gestures.	.54		
43. (45.) I expressed reassurance.	.57		
Dominant			
5. I gave information.	.66	-.39	

8. I expressed an opinion.	.63		
15. I took the lead in planning/organizing a project or activity.			-.40
22. (23.) I spoke in a clear firm voice.	.40		
26. (27.) I asked others to do something.		.55	
29. (31.) I got immediately to the point.	.42		
33. (35.) I tried to get others to do something else.		.68	
37. (39.) I made suggestions.	.63		
41. (43.) I assigned someone to a task.		.57	
Quarrelsome			
7. I criticized others.		.70	
11. I raised my voice.		.48	
18. I demanded that others do what I wanted.		.62	
21. (22.) I discredited what someone said.		.55	
25. (26.) I confronted others about something I did not like.		.45	
32. (34.) I stated strongly that I did not like or that I would not do something.		.49	
36. (38.) I ignored another's comments.		.42	
40. (42.) I withheld useful information.		.50	
44. (46.) I showed impatience.		.38	
Submissive			
2. I waited for another person to act or talk first.			.61
12. I spoke softly.			.40
16. I let others make plans or decisions.			.41
19. (20.) I gave in.		.40	.50
23. (24.) I spoke only when I was spoken to.			.54

27. (28.) I did not say what I wanted directly.		.49
30. (32.) I did not state my own views.		.52
34. (36.) I did not say how I felt.	.43	.59
38. (40.) I avoided taking the lead or being responsible.		.82
42. (44.) I did not say what was on my mind.		.64

Note. Only loadings higher than .35 (or lower than -.35) are shown. Item numbers for the observer-situational measure are different than the item numbers for the trait measure (as shown in brackets), because items 19 and items 30 of the trait measure were not included.

Table 11

2003 Dataset High Factor Loadings for SBI Trait Items

	Factors in Varimax Rotated Solution		
	Factor 1 "disagreeable"	Factor 2 "lack of behaviour"	Factor 3 "extraversion"
Initial eigenvalue	6.44	5.05	3.29
Variance accounted for by each rotated factor	9.81%	9.34%	8.47%
Items by Sub-scale			
Agreeable			
3. I listened attentively to others.			.51
10. I spoke favourably of someone who was not present.			.50
13. I compromised about a decision.			.36
17. I complimented or praised others.			.63
21. I smiled and laughed with others.			.59
25. I showed sympathy.			.59
29. I exchanged pleasantries.			.51
45. I expressed reassurance.			.61
Dominant			
5. I gave information.			.40
8. I expressed an opinion.			.37
15. I took the lead in planning/organizing a project or activity.	.41		

19. I asked for a volunteer.	.48
27. I asked others to do something.	.43
35. I tried to get others to do something else.	.59
39. I made suggestions.	.51
43. I assigned someone to a task.	.55

Quarrelsome

7. I criticized others.	.42
18. I demanded that others do what I wanted.	.55
22. I discredited what someone said.	.54
26. I confronted others about something I did not like.	.43
30. I gave incorrect information.	.37
34. I stated strongly that I did not like or that I would not do something.	.49
38. I ignored another's comments.	.38
42. I withheld useful information.	.50

Submissive

2. I waited for another person to act or talk first.	.56
6. I went along with the views or wishes of another person.	.37
9. I did not express disagreement when I thought it.	.54
16. I let others make plans or decisions.	.46
20. I gave in.	.44
24. I spoke only when I was spoken to.	.37
28. I did not say what I wanted directly.	.63
32. I did not state my own views.	.64
36. I did not say how I felt.	.54
40. I avoided taking the lead or being responsible.	.48

44. I did not say what was on my mind.	.65

Note. Only loadings higher than .35 (or lower than -.35) are shown.

Table 12

2005 Dataset High Factor Loadings for SBI Trait Items

	Factors in Varimax Rotated Solution		
	Factor 1 "extraversion"	Factor 2 "lack of behaviour"	Factor 3 "disagreeable"
Initial eigenvalue	7.09	5.30	3.37
Variance accounted for by each rotated factor	10.97%	10.20%	8.60%
Items by Sub-scale			
Agreeable			
3. I listened attentively to others.	.47		
10. I spoke favourably of someone who was not present.	.58		
13. I compromised about a decision.	.38		
17. I complimented or praised others.	.66		
21. I smiled and laughed with others.	.50		
25. I showed sympathy.	.55		
29. I exchanged pleasantries.	.50		
33. I pointed out to others where there was agreement.	.47		
37. I expressed affection with words or gestures.	.55		
45. I expressed reassurance.	.62		
Dominant			
5. I gave information.	.49		
8. I expressed an opinion.	.44	-.38	
15. I took the lead in planning/organizing a project or	.44		

activity.			
23. I spoke in a clear firm voice.	.42		
27. I asked others to do something.			.43
31. I got immediately to the point.	.35		
35. I tried to get others to do something else.			.54
39. I made suggestions.	.56		
43. I assigned someone to a task.			.48
Quarrelsome			
7. I criticized others.			.53
11. I raised my voice.			.53
18. I demanded that others do what I wanted.			.64
22. I discredited what someone said.			.53
26. I confronted others about something I did not like.	.39		.44
34. I stated strongly that I did not like or that I would not do something.			.40
38. I ignored another's comments.			.44
42. I withheld useful information.			.36
46. I showed impatience.			.516
Submissive			
2. I waited for another person to act or talk first.		.55	
6. I went along with the views or wishes of another person.		.44	
9. I did not express disagreement when I thought it.		.56	
12. I spoke softly.		.41	
16. I let others make plans or decisions.		.52	
20. I gave in.		.54	
24. I spoke only when I was spoken to.		.39	

28. I did not say what I wanted directly.	.56
32. I did not state my own views.	.64
36. I did not say how I felt.	.65
40. I avoided taking the lead or being responsible.	.57
44. I did not say what was on my mind.	.75

Note. Only loadings higher than .35 (or lower than -.35) are shown.

Table 13

2007 Dataset High Factor Loadings for SBI Trait Items

	Factors in Varimax Rotated Solution		
	Factor 1 "lack of behavior"	Factor 2 "extraversion"	Factor 3 "disagreeable"
Initial eigenvalue	5.96	5.15	3.18
Variance accounted for by each rotated factor	9.37%	8.90%	8.21%
Items by Sub-scale			
Agreeable			
3. I listened attentively to others.		.39	
10. I spoke favourably of someone who was not present.		.54	
13. I compromised about a decision.		.36	
17. I complimented or praised others.		.61	
21. I smiled and laughed with others.		.45	
25. I showed sympathy.		.54	
29. I exchanged pleasantries.		.37	
33. I pointed out to others where there was agreement.		.40	
37. I expressed affection with words or gestures.		.54	
45. I expressed reassurance.		.57	
Dominant			
5. I gave information.		.46	
8. I expressed an opinion.	-.40	.40	

15. I took the lead in planning/organizing a project or activity.		.37	
27. I asked others to do something.			.42
35. I tried to get others to do something else.			.51
39. I made suggestions.		.54	
43. I assigned someone to a task.			.39
Quarrelsome			
4. I did not respond to another's questions or comments.			.35
7. I criticized others.			.61
11. I raised my voice.			.52
18. I demanded that others do what I wanted.			.62
22. I discredited what someone said.			.59
30. I gave incorrect information.			.37
38. I ignored another's comments.			.48
42. I withheld useful information.			.38
46. I showed impatience.			.52
Submissive			
2. I waited for another person to act or talk first.	.49		
6. I went along with the views or wishes of another person.	.37		
9. I did not express disagreement when I thought it.	.53		
12. I spoke softly.	.42		
16. I let others make plans or decisions.	.46		
20. I gave in.	.49		
28. I did not say what I wanted directly.	.57		
32. I did not state my own views.	.62		

36. I did not say how I felt.	.66
40. I avoided taking the lead or being responsible.	.51
44. I did not say what was on my mind.	.66

Note. Only loadings higher than .35 (or lower than -.35) are shown.

Table 14

2005 Ipsatized Dataset High Factor Loadings for SBI Trait Items

	Factors in Varimax Rotated Solution	
	Factor 1 "dominance"	Factor 2 "affiliation"
Initial eigenvalue	7.17	3.87
Variance accounted for by each rotated factor	13.20%	8.00%
Items by Sub-scale		
Agreeable		
3. I listened attentively to others.		.48
10. I spoke favourably of someone who was not present.		.44
17. I complimented or praised others.		.53
21. I smiled and laughed with others.		.42
25. I showed sympathy.		.43
29. I exchanged pleasantries.		.36
37. I expressed affection with words or gestures.		.44
45. I expressed reassurance.		.51
Dominant		
8. I expressed an opinion.	.56	
15. I took the lead in planning/organizing a project or activity.	.49	
23. I spoke in a clear firm voice.	.53	
39. I made suggestions.	.47	
43. I assigned someone to a task.	.42	

Quarrelsome		
4. I did not respond to another's questions or comments.		-.36
7. I criticized others.		-.40
11. I raised my voice.	.40	
18. I demanded that others do what I wanted.		-.47
22. I discredited what someone said.		-.39
26. I confronted others about something I did not like.	.51	
34. I stated strongly that I did not like or that I would not do something.	.38	
38. I ignored another's comments.		-.40
42. I withheld useful information.		-.37
46. I showed impatience.		-.44
Submissive		
2. I waited for another person to act or talk first.	-.54	
6. I went along with the views or wishes of another person.	-.34	
9. I did not express disagreement when I thought it.	-.54	
12. I spoke softly.	-.41	
16. I let others make plans or decisions.	-.51	
20. I gave in.	-.42	
24. I spoke only when I was spoken to.	-.40	
28. I did not say what I wanted directly.	-.47	
32. I did not state my own views.	-.59	
36. I did not say how I felt.	-.63	
40. I avoided taking the lead or being responsible.	-.59	
44. I did not say what was on my mind.	-.71	

Note. Only loadings higher than .35 (or lower than -.35) are shown.

Table 15

2007 Ipsatized Dataset High Factor Loadings for SBI Trait Items

	Factors in Varimax Rotated Solution	
	Factor 1 "dominance"	Factor 2 "affiliation"
Initial eigenvalue	6.10	3.68
Variance accounted for by each rotated factor	11.22%	7.07%
Items by Sub-scale		
Agreeable		
3. I listened attentively to others.		-.47
10. I spoke favourably of someone who was not present.		-.38
17. I complimented or praised others.		-.45
21. I smiled and laughed with others.		-.37
25. I showed sympathy.		-.45
37. I expressed affection with words or gestures.		-.39
45. I expressed reassurance.		-.47
Dominant		
7. I criticized others.		.50
8. I expressed an opinion.	.57	
15. I took the lead in planning/organizing a project or activity.	.44	
23. I spoke in a clear firm voice.	.40	
39. I made suggestions.	.469	
Quarrelsome		

7. I criticized others.		.50
18. I demanded that others do what I wanted.		.47
22. I discredited what someone said.		.49
26. I confronted others about something I did not like.	.49	
34. I stated strongly that I did not like or that I would not do something.	.40	
38. I ignored another's comments.		.40
46. I showed impatience.		.39
Submissive		
2. I waited for another person to act or talk first.	-.45	
9. I did not express disagreement when I thought it.	-.49	
12. I spoke softly.	-.42	
16. I let others make plans or decisions.	-.44	
20. I gave in.	-.36	
24. I spoke only when I was spoken to.	-.32	
28. I did not say what I wanted directly.	-.48	
32. I did not state my own views.	-.61	
36. I did not say how I felt.	-.65	
40. I avoided taking the lead or being responsible.	-.52	
44. I did not say what was on my mind.	-.65	

Note. Only loadings higher than .35 (or lower than -.35) are shown.

Table 16

Sub-scale Correlations of Raw and Ipsatized Data

	2005				2007			
Raw data								
		D	S	A		D	S	A
	S	-.19			S	-.18		
	A	.49	.16		A	.43	.15	
	Q	.56	.13	.19	Q	.52	.17	.16
Ipsatized data								
		D	S	A		D	S	A
	S	-.80			S	-.77		
	A	-.03	-.25		A	-.05	-.25	
	Q	.11	-.30	-.64	Q	.07	-.28	-.63

Note. D = dominant self-reported trait SBI ratings, S = submissive self-reported trait SBI ratings, A = agreeable self-reported trait SBI ratings, and Q = quarrelsome self-reported trait SBI ratings

Table 17

Overall Categorical Ratings of SBI Items as Either Engaged or Disengaged Behaviours

Sub-scale and Item	Overall Rating
Agreeable	
3. I listened attentively to others.	Engaged (2)
6. I went along with the views or wishes of another person.	Engaged (3)
10. I spoke favourably of someone who was not present.	Engaged (3)
13. I compromised about a decision.	Engaged (2)
17. I complimented or praised others.	Engaged (3)
21. I smiled and laughed with others.	Engaged (3)
25. I showed sympathy.	Engaged (3)
29. I exchanged pleasantries.	Engaged (3)
33. I pointed out to others where there was agreement.	Engaged (3)
37. I expressed affection with words or gestures.	Engaged (3)
41. I made a concession to avoid unpleasantness.	Engaged (2)
45. I expressed reassurance.	Engaged (3)
Dominant	
1. I set goals for others.	Engaged (3)
5. I gave information.	Engaged (3)
7. I criticized others.	Engaged (3)
8. I expressed an opinion.	Engaged (3)
15. I took the lead in planning/organizing a project or activity.	Engaged (3)
19. I asked for a volunteer.	Engaged (3)

23. I spoke in a clear firm voice.	Engaged (3)
27. I asked others to do something.	Engaged (3)
31. I got immediately to the point.	Engaged (3)
35. I tried to get others to do something else.	Engaged (3)
39. I made suggestions.	Engaged (3)
43. I assigned someone to a task.	Engaged (3)
Quarrelsome	
4. I did not respond to another's questions or comments.	Disengaged (3)
7. I criticized others.	Engaged (3)
11. I raised my voice.	Engaged (3)
14. I made a sarcastic comment.	Engaged (3)
18. I demanded that others do what I wanted.	Engaged (3)
22. I discredited what someone said.	Engaged (3)
26. I confronted others about something I did not like.	Engaged (3)
30. I gave incorrect information.	Engaged (3)
34. I stated strongly that I did not like or that I would not do something.	Engaged (3)
38. I ignored another's comments.	Disengaged (3)
42. I withheld useful information.	Disengaged (2)
46. I showed impatience.	Engaged (3)
Submissive	
2. I waited for another person to act or talk first.	Engaged (2)
6. I went along with the views or wishes of another person.	Engaged (3)

9. I did not express disagreement when I thought it.	Disengaged (3)
12. I spoke softly.	Engaged (2)
16. I let others make plans or decisions.	Disengaged (2)
20. I gave in.	Mixed
24. I spoke only when I was spoken to.	Mixed
28. I did not say what I wanted directly.	Mixed
32. I did not state my own views.	Disengaged (3)
36. I did not say how I felt.	Disengaged (3)
40. I avoided taking the lead or being responsible.	Disengaged (3)
44. I did not say what was on my mind.	Disengaged (3)

Note. Engaged = three or two of the three coders categorized the item as engaged; Disengaged = three or two of the three coders categorized the item as disengaged; Mixed = two coders categorized the item different (engaged or disengaged) and one coder was undecided. The number of coders agreeing for Disengaged and Engaged overall rating is noted in brackets. The removal of coder 3 changed the category of only 1 item (SBI item 13) from mixed to engaged.

Figure 1. Interpersonal circumplex

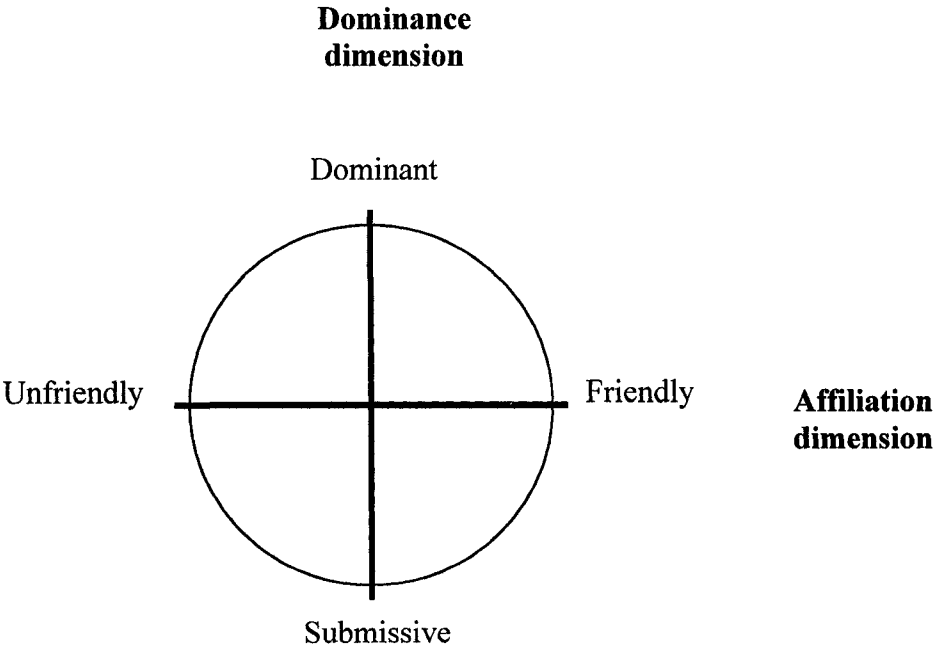


Figure 2a. Model for acquiescence predicting self and observer ratings

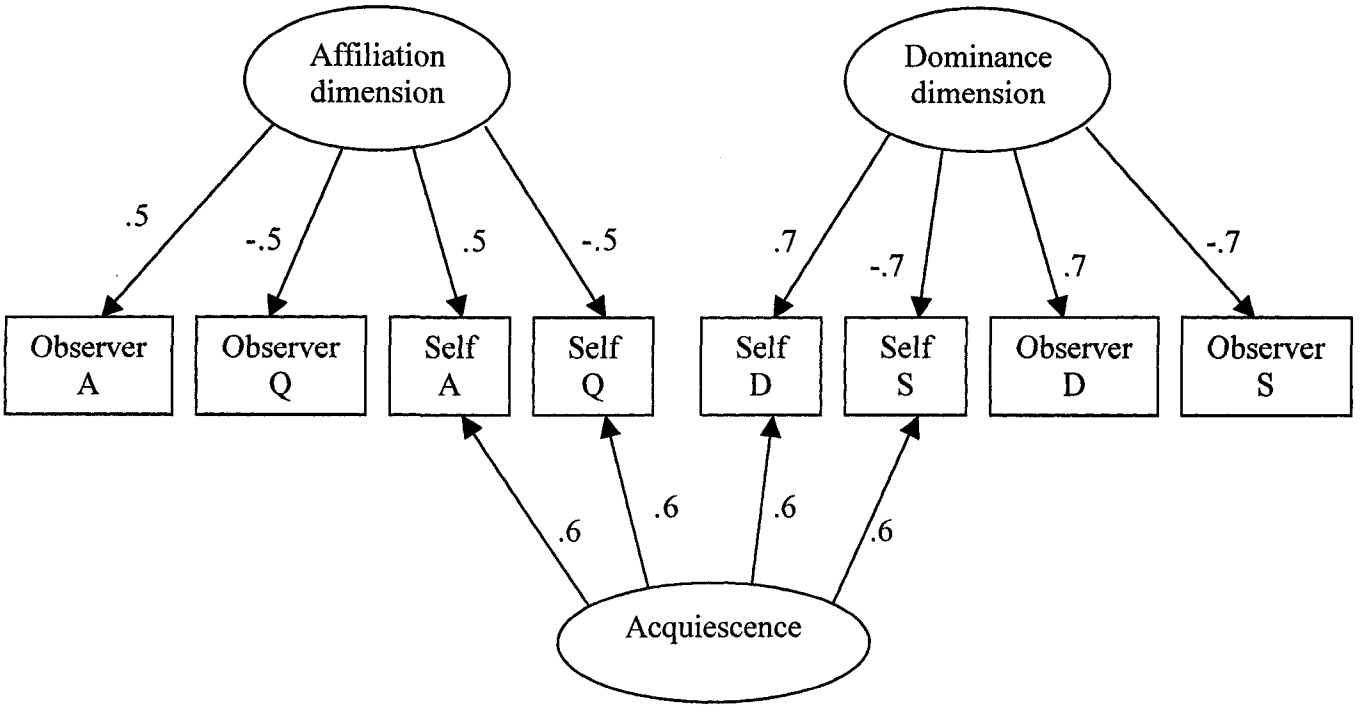


Figure 2b Model for social desirability predicting self and observer ratings

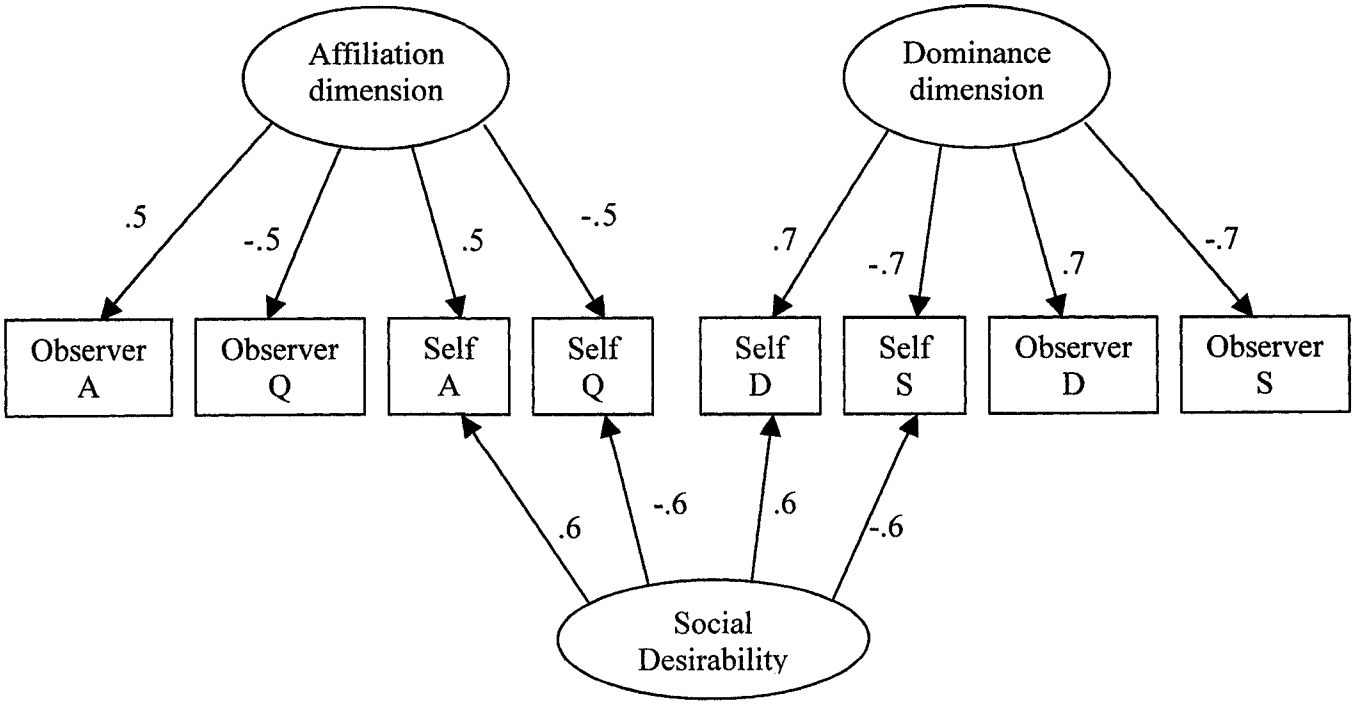


Figure 2c. Model for engagement predicting self and observer ratings

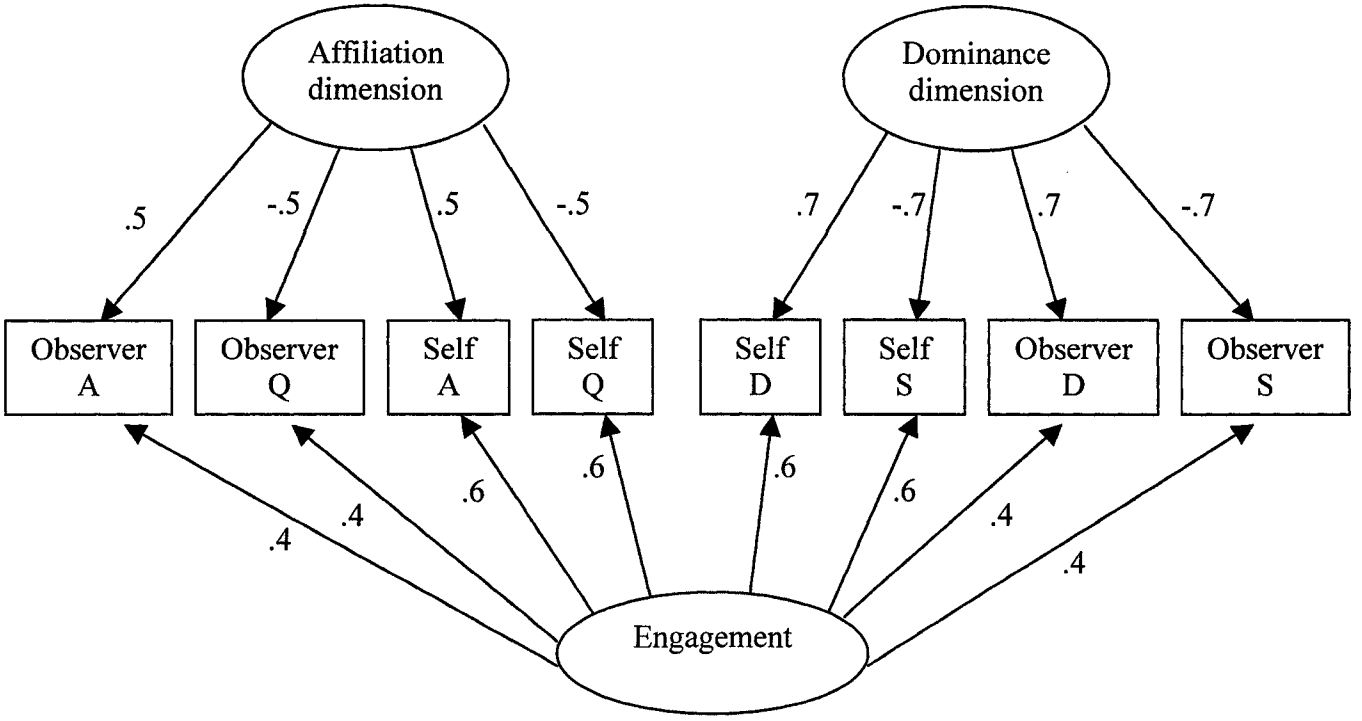


Figure 3a. Scree plot of 2003 SBI Self-Situational Data

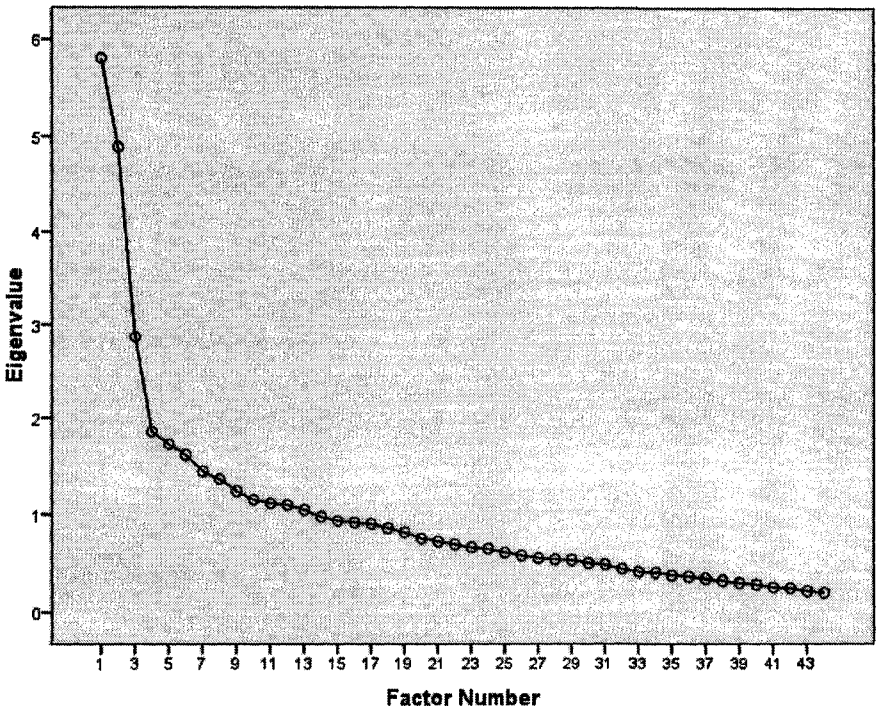


Figure 3b. Scree plot of 2003 SBI Observer-Situational Data

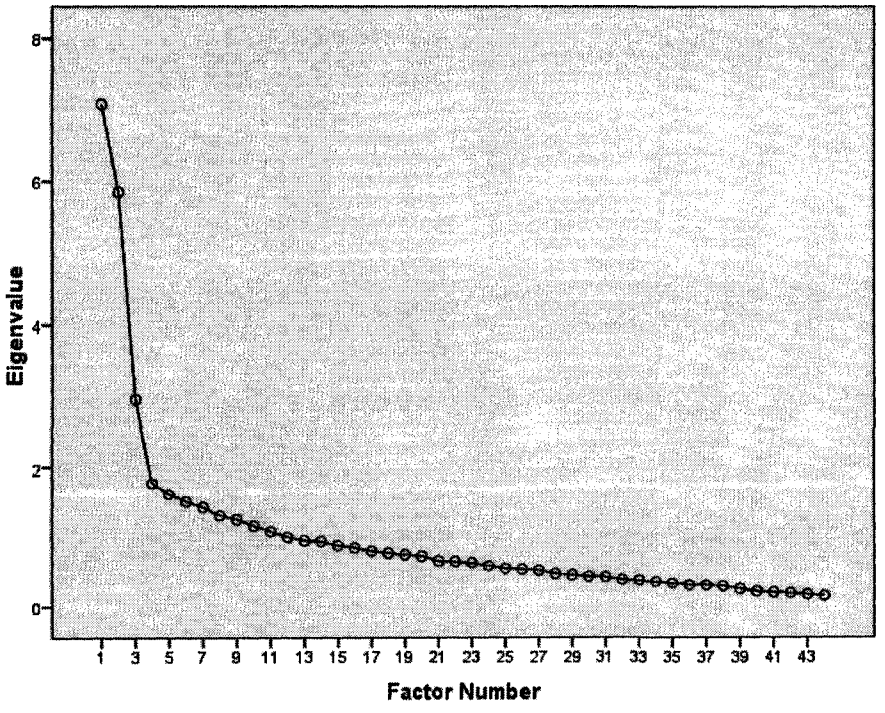


Figure 3c. Scree plot of 2003 SBI Trait Data

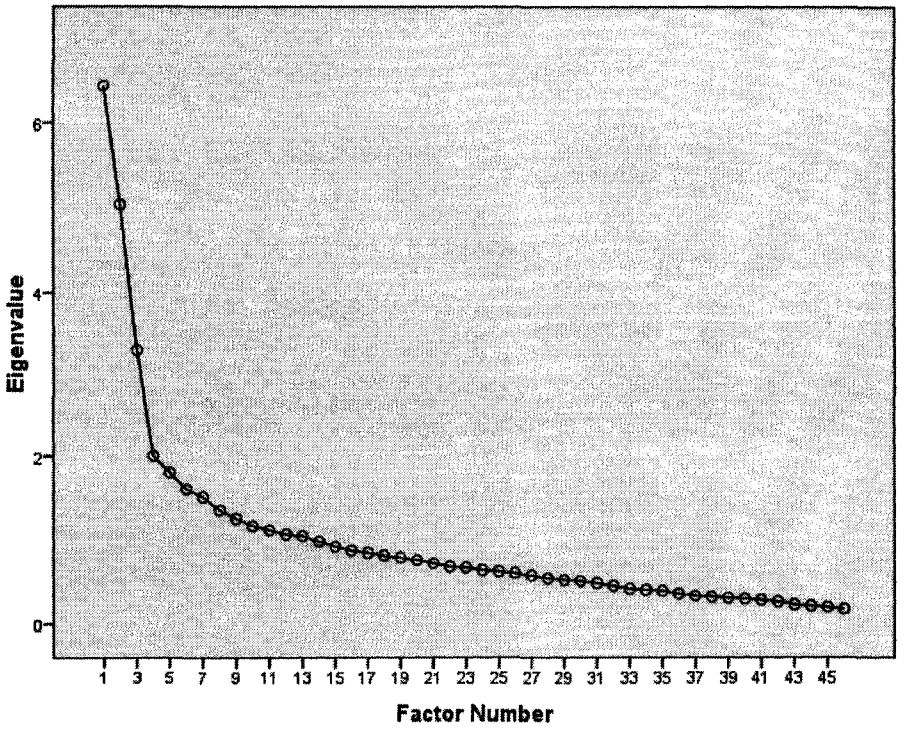


Figure 4a. Scree plot of 2005 SBI Trait Data

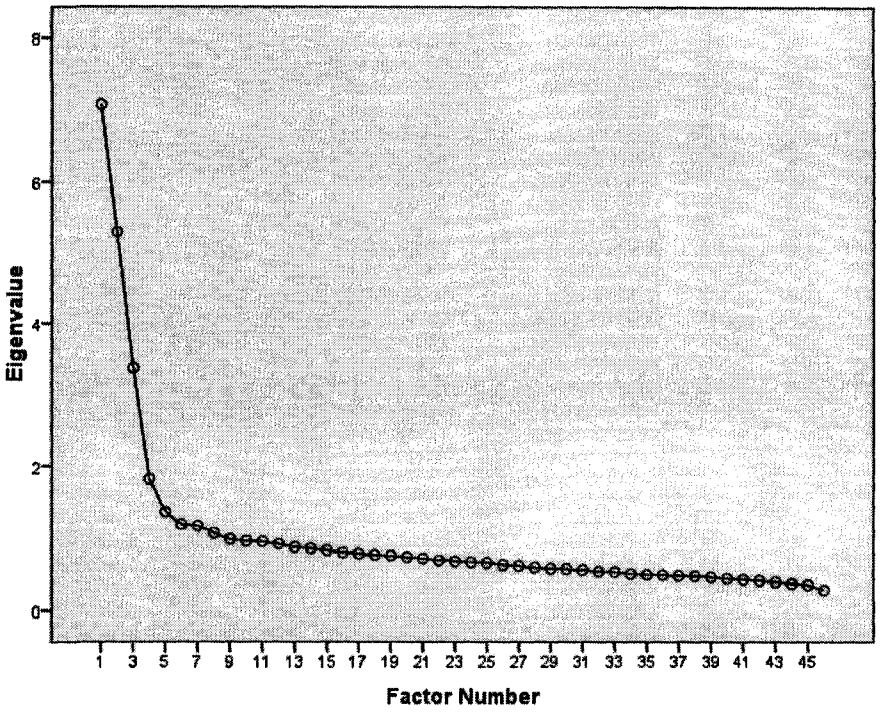


Figure 4b. Scree plot of 2007 SBI Trait Data

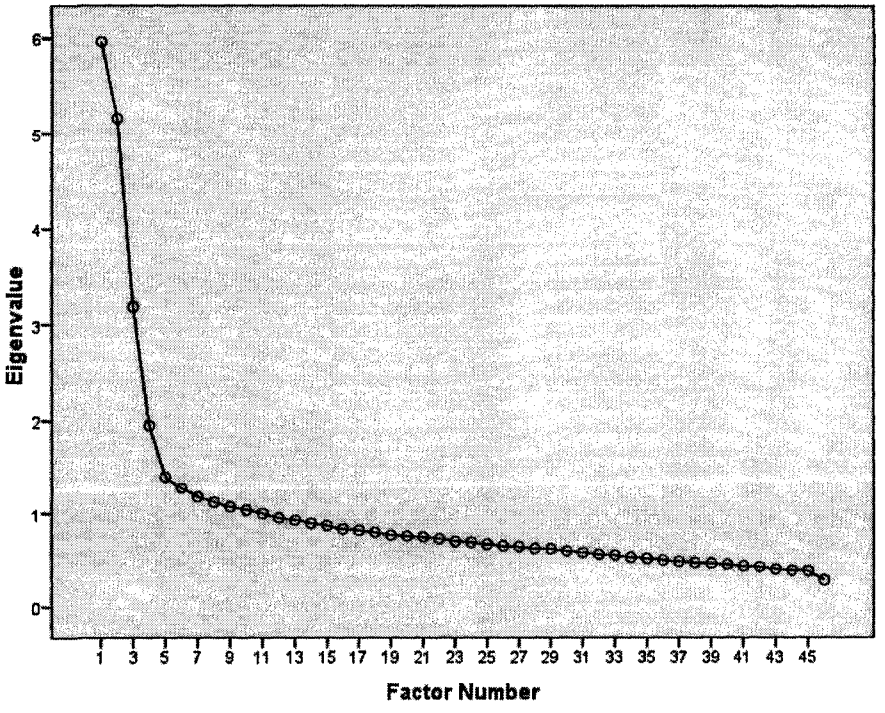


Figure 5a. Scree plot of 2005 Ipsatized SBI Trait Data

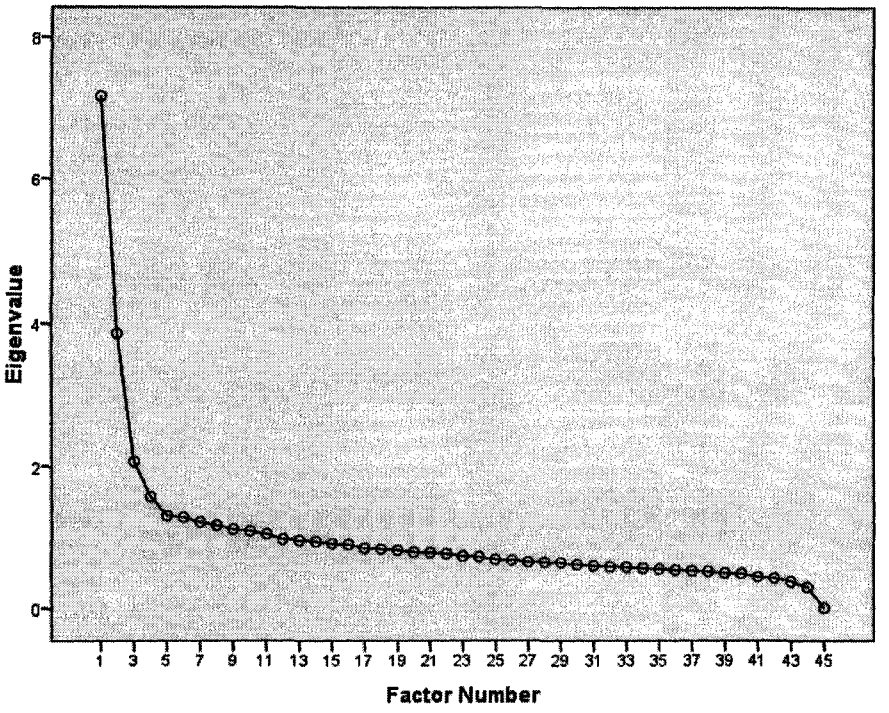
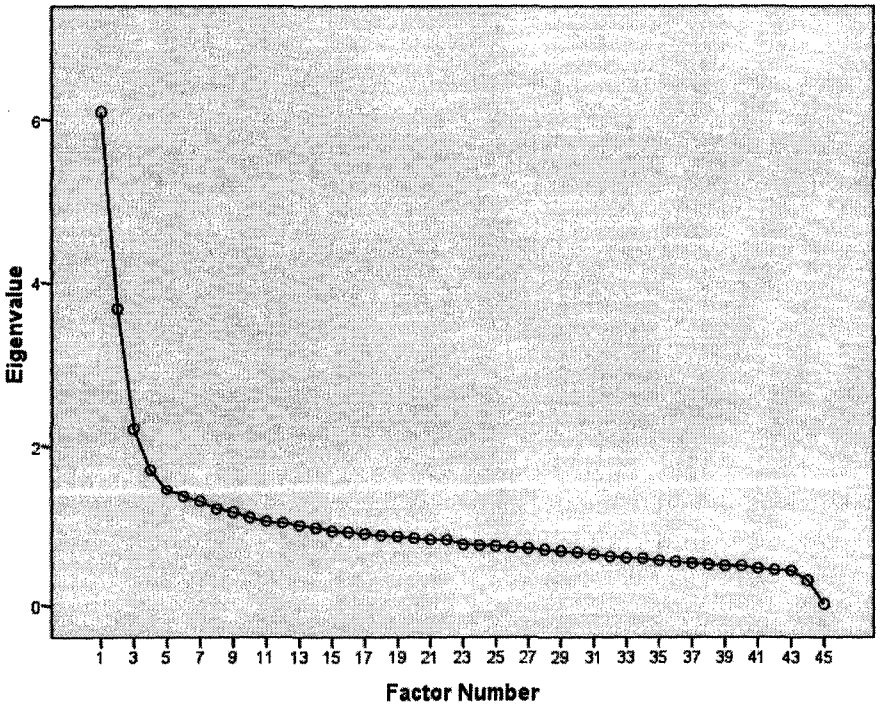


Figure 5b. Scree plot of 2007 Ipsatized SBI Trait Data



Appendix A

Social Behavior Inventory – Self-Reported Trait version

Instructions: Over the last 1 month, please indicate how often you engaged in the behaviors described by using the scale below.

	Never	Rarely	Occasionally	Often	Very Often	Almost Always
1. I set goals for others.	1	2	3	4	5	6
2. I waited for another person to act or talk first.	1	2	3	4	5	6
3. I listened attentively to others.	1	2	3	4	5	6
4. I did not respond to another's questions or comments.	1	2	3	4	5	6
5. I gave information.	1	2	3	4	5	6
6. I went along with the views or wishes of another person.	1	2	3	4	5	6
7. I criticized others.	1	2	3	4	5	6
8. I expressed an opinion.	1	2	3	4	5	6
9. I did not express disagreement when I thought it.	1	2	3	4	5	6
10. I spoke favourably of someone who was not present.	1	2	3	4	5	6
11. I raised my voice.	1	2	3	4	5	6
12. I spoke softly.	1	2	3	4	5	6
13. I compromised about a decision.	1	2	3	4	5	6
14. I made a sarcastic comment.	1	2	3	4	5	6
15. I took the lead in planning/organizing a project or activity.	1	2	3	4	5	6
16. I let others make plans or decisions.	1	2	3	4	5	6

	Never	Rarely	Occasionally	Often	Very Often	Almost Always
17. I complimented or praised others.	1	2	3	4	5	6
18. I demanded that others do what I wanted.	1	2	3	4	5	6
19. I asked for a volunteer.	1	2	3	4	5	6
20. I gave in.	1	2	3	4	5	6
21. I smiled and laughed with others.	1	2	3	4	5	6
22. I discredited what someone said.	1	2	3	4	5	6
23. I spoke in a clear firm voice.	1	2	3	4	5	6
24. I spoke only when I was spoken to.	1	2	3	4	5	6
25. I showed sympathy.	1	2	3	4	5	6
26. I confronted others about something I did not like.	1	2	3	4	5	6
27. I asked others to do something.	1	2	3	4	5	6
28. I did not say what I wanted directly.	1	2	3	4	5	6
29. I exchanged pleasantries.	1	2	3	4	5	6
30. I gave incorrect information.	1	2	3	4	5	6
31. I got immediately to the point.	1	2	3	4	5	6
32. I did not state my own views.	1	2	3	4	5	6
33. I pointed out to others where there was agreement.	1	2	3	4	5	6
34. I stated strongly that I did not like or that I would not do something.	1	2	3	4	5	6
35. I tried to get others to do something else.	1	2	3	4	5	6
36. I did not say how I felt.	1	2	3	4	5	6
37. I expressed affection with words or gestures.	1	2	3	4	5	6
38. I ignored another's comments.	1	2	3	4	5	6

	Never	Rarely	Occasionally	Often	Very Often	Almost Always
39. I made suggestions.	1	2	3	4	5	6
40. I avoided taking the lead or being responsible.	1	2	3	4	5	6
41. I made a concession to avoid unpleasantness.	1	2	3	4	5	6
42. I withheld useful information.	1	2	3	4	5	6
43. I assigned someone to a task.	1	2	3	4	5	6
44. I did not say what was on my mind.	1	2	3	4	5	6
45. I expressed reassurance.	1	2	3	4	5	6
46. I showed impatience.	1	2	3	4	5	6

Appendix B

Variance Removed from Likert-Based SBI Sub-scales by Ipsatization

Sub-scale	Sadler (1997)	2003 Self Situational	2003 Observer Situational	2003 Self Trait	2005 Self Trait	2007 Self Trait
Dominant	.49	.42	.40	.50	.50	.46
Submissive	.23	.14	.26	.32	.18	.22
Agreeable	.54	.51	.54	.47	.50	.45
Quarrelsome	.51	.26	.39	.54	.51	.49