

Testing for Circumplex Structure in the Interpersonal Circle and the Structural Analysis of Social Behavior

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Author Note

INTRODUCTION

"A cord of three strands is not easily broken."

A. Interpersonal Theory: A Cord of Three Strands

The circumplex tradition in interpersonal psychology was inspired by the interpersonal theory of Harry Stack Sullivan (1953), and made more explicit and accessible to research by Timothy Leary (1957), who introduced the circular ordering of variables known as the interpersonal circumplex. Interpersonal theory comprises three strands of leading ideas: the principle of complementarity, the principle of vector length, and the principle of circumplex structure.

The first strand of interpersonal theory is the principle of complementarity (Carson, 1969; Kiesler, 1983; Orford, 1986; Wiggins, 1982), which contends that people in dyadic interactions negotiate the definition of their relationship through verbal and nonverbal cues. This negotiation occurs along the following lines: dominant-friendliness invites submissive-friendliness, and vice versa, while dominant-hostility invites submissive-hostility, and vice versa.

The second strand of interpersonal theory is the principle of vector length, which contends that within diagnoses of personality type on the Interpersonal Circle, vector length (a measure of statistical deviance) is an index of psychopathology (psychiatric deviance; Wiggins, et al., 1989). In general, people with rigid, inflexible personalities have more problems--even if such people are inflexible in a friendly direction--while people with flexible, adaptive personalities have fewer problems--even if such people are generally more hostile than friendly.

The third strand of interpersonal theory is the principle of circumplex structure, which contends that variables that measure interpersonal relations are arranged around a circle in two-dimensional space (Leary, 1957). The present study represents an attempt to break this third strand by subjecting it to empirical test.

Two circumplex models have been proposed to represent the interpersonal domain, the Interpersonal Circle (Leary, 1957) and the Structural Analysis of Social Behavior (SASB; Benjamin, 1974). These models are shown in Figure 1. [Note: This figure is not yet available on the internet.] The Interpersonal Circle has dimensions of affiliation (love vs. hatred) and power (dominance vs. submission). The SASB shares the dimension of affiliation, but differs on the dimension of enmeshment (involvement vs. freedom). This study tested the circumplex structure of two measures of these models, the Inventory of Interpersonal Problems (Horowitz, et al., 1988; Alden, et al., 1990), and the Intrex Questionnaire (Benjamin, 1993), respectively.

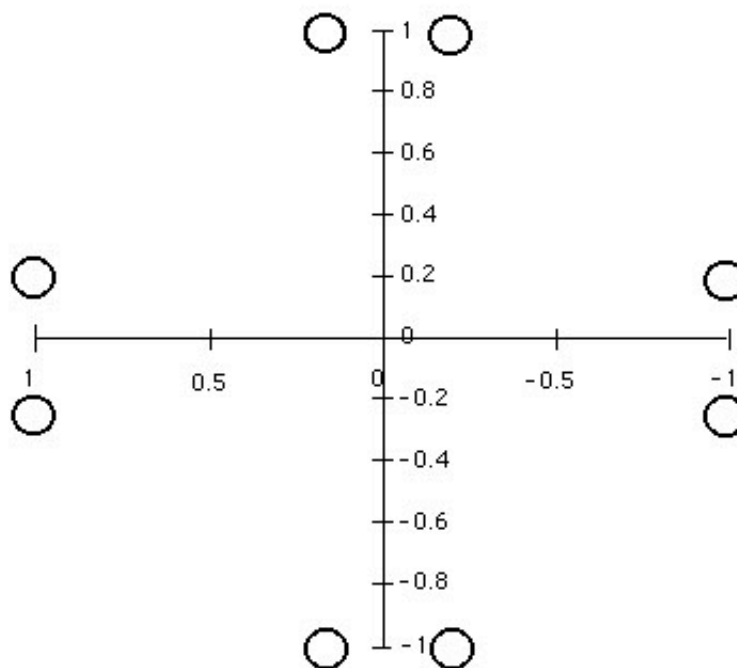
The Inventory of Interpersonal Problems (IIP) is a 127-item questionnaire that was composed from the most common complaints of psychiatric patients at intake interviews. Alden, et al. (1990) created a 64-item version of the IIP with eight circumplex scales corresponding to the eight octants of the Interpersonal Circle.

The Intrex Questionnaire (Benjamin, 1993) is a 108-item inventory comprised of theoretically-derived items designed to measure a subject's behaviors in relation to a specific other person, the other person's behaviors toward the subject, and the subject's general feelings about him- or herself. These items correspond to three surfaces in the SASB model, the self, other, and introject surfaces, respectively.

B. Circumplex Versus Simple Structure: The Very Simple Structure Criterion

An alternative to circumplex structure is simple structure. Figure 2 shows a representation of circumplex and simple structure in which the circles represent items (or scales) on a questionnaire. Notice that in a circumplex, items are evenly distributed around the circle, while in a simple structure, items fall exclusively on one of the two axes. Figure 3 shows a structural model of circumplex and simple structure. Notice that some items in a circumplex (those that lie on the diagonals) load on more than one factor, while items in a simple structure load on one and only one factor.

SIMPLE STRUCTURE



CIRCUMPLEX STRUCTURE

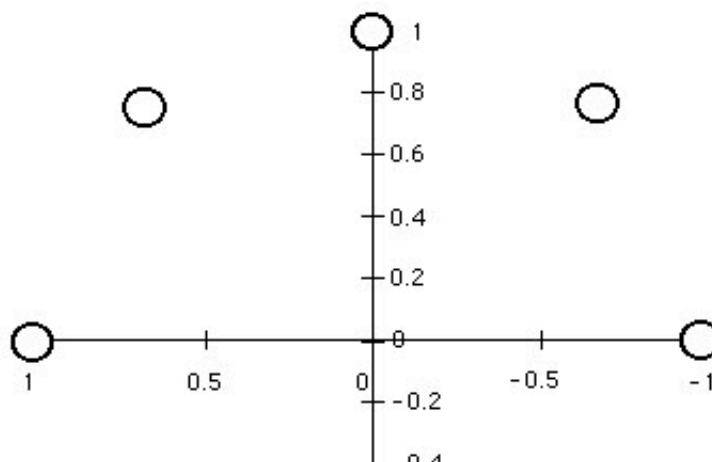


Figure 2

**SIMPLE
STRUCTURE**

**CIRCUMPLEX
STRUCTURE**

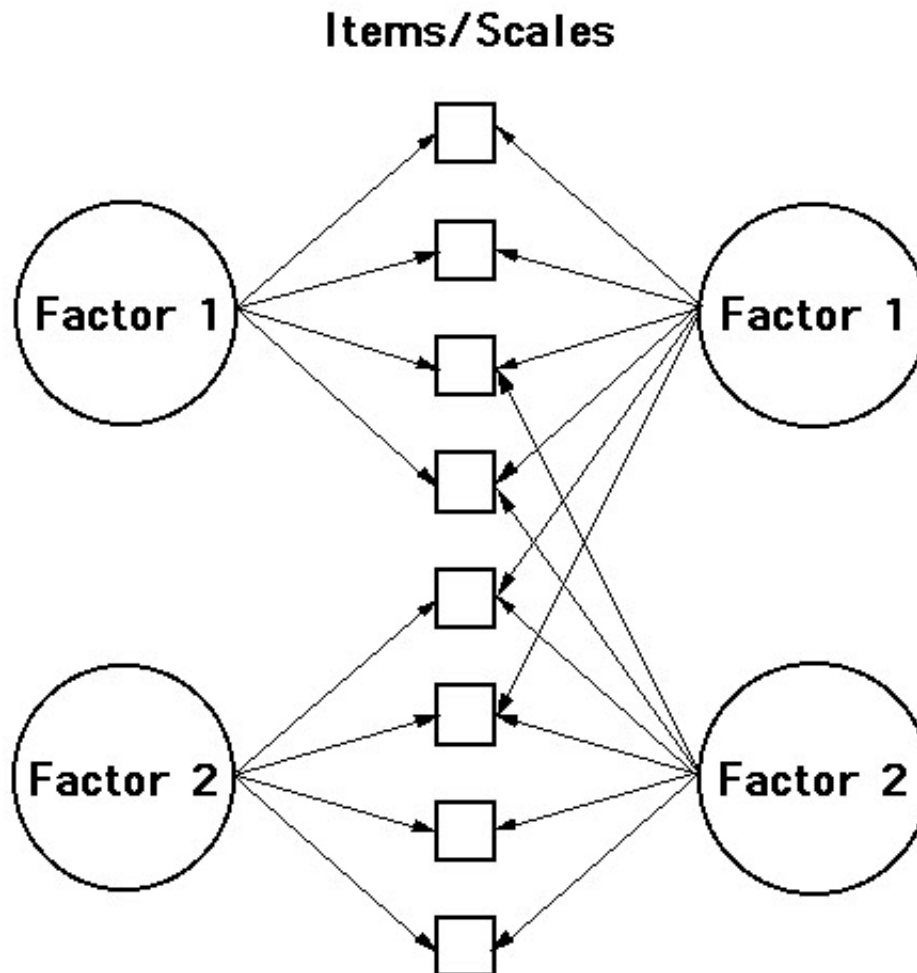


Figure 3

The means used to detect circumplex structure in this study was the Very Simple Structure criterion (VSS; Revelle & Rocklin, 1979). VSS is a procedure for determining the optimal number of factors to extract from a correlation matrix. VSS also gives an index of the degree to which a factor matrix departs from simple structure (or, alternatively, the degree to which it approaches circumplex structure) called the complexity of the factor matrix. VSS works by degrading the factor matrix, replacing the smallest factor loading with zero. Therefore,

Complexity 3				Complexity 2				Complexity 1		
1	2	3		1	2	3		1	2	3
.11	.20	.15	--->	0	.20	.15	--->	0	.20	0
.42	.21	.13	--->	.42	.21	0	--->	.42	0	0
.23	.25	.14	--->	.23	.25	0	--->	0	.25	0

VSS provides an index of the difference in goodness-of-fit between complexity 3, complexity 2, and complexity 1. The goodness-of-fit criterion is calculated as follows:

First, in keeping with the general factor model, the $\text{Model} = R_{\text{predicted}} = F'F + U^2$.
 Second, $R_{\text{residuals}} = R_{\text{data}} - R_{\text{predicted}}$. Third, the VSS goodness-of-fit index = $\text{VSS}_{\text{goodness-of-fit}} = 1 - (\text{Sum of } R_{\text{residuals}}^2 / \text{Sum of } R_{\text{data}}^2) = (\text{Data} - \text{Model})^2 / \text{Data}^2$.

METHOD

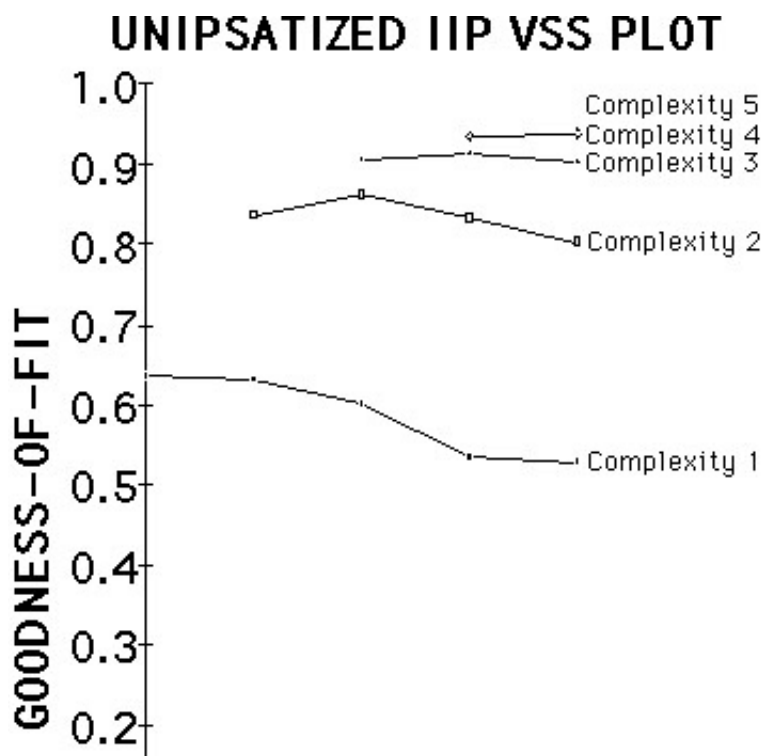
IIP and SASB questionnaires were given to a sample of introductory psychology students at Northwestern University. 63 IIP items were drawn from the 64-item circumplex scales ($N = 83$). IIP items appear in two forms: "It is hard for me to . . .", and "I . . . too much." Example IIP items are, "It is hard for me to get along with other people," and, "I try to change other people too much." 76 Intrex items were drawn from the 36 items in each of the SASB self, other, and introject surfaces (108 items total; $N = 66$). Subjects were instructed to answer as follows: "To what extent do the following statements describe you or your relationship with your present (or most recent) roommate?" Example items from the self, other, and introject surfaces, respectively, are, "You go your own separate way apart from this person," "Without concern this person lets you do and be anything at all," and, "You let yourself drift with the moment; you have no internal direction, goals, or standards."

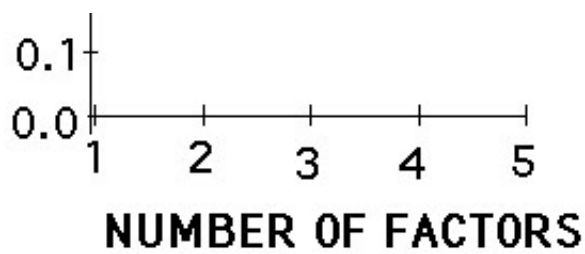
In order to test the effect of the general factor--the first and largest factor, which loads on every item--data were analyzed in both raw and ipsatized form. Ipsatizing is subtracting the mean of the subject from the subject's score on each item. Ipsatizing has the effect of removing the general factor.

Due to an interest in computer adaptive testing, data were collected in two ways--using a paper-and-pencil format and using a computer format--to see if there would be any reliable differences. No differences in results between the two formats were found.

RESULTS

Figures 4 and 5 show the Very Simple Structure results. A perfect circumplex would (1) have a better goodness-of-fit for two factors than for any other number of factors, and (2) have an increase in goodness-of-fit from complexity 1 to complexity 2 that is nearly as great as the increase in goodness-of-fit from the origin to complexity 1.





IPSATISED IIP VSS PLOT

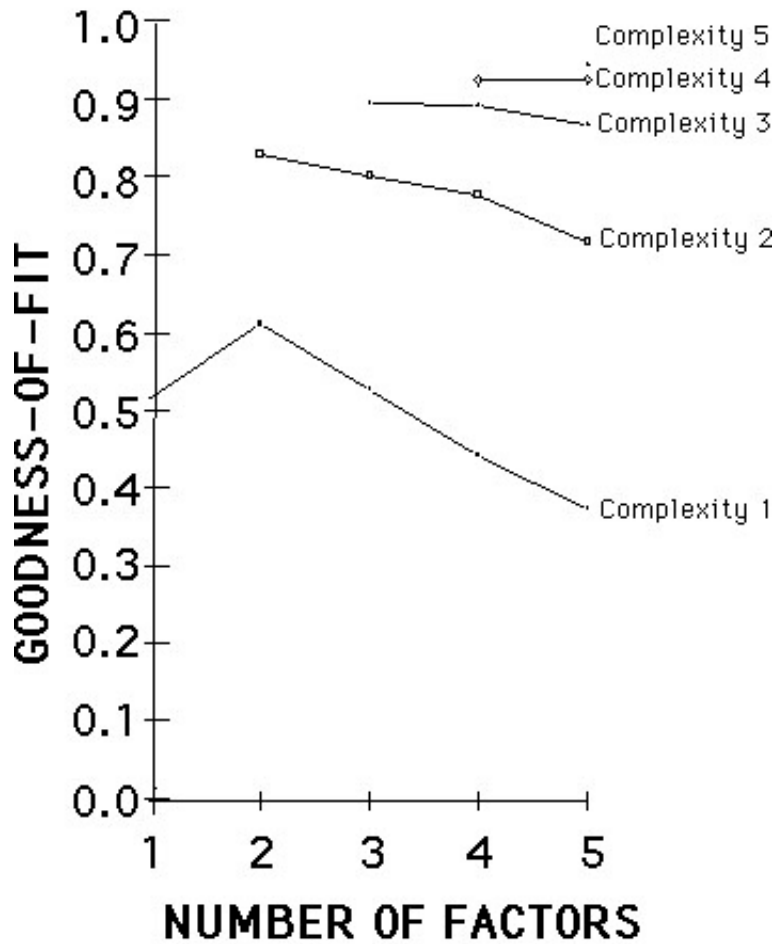
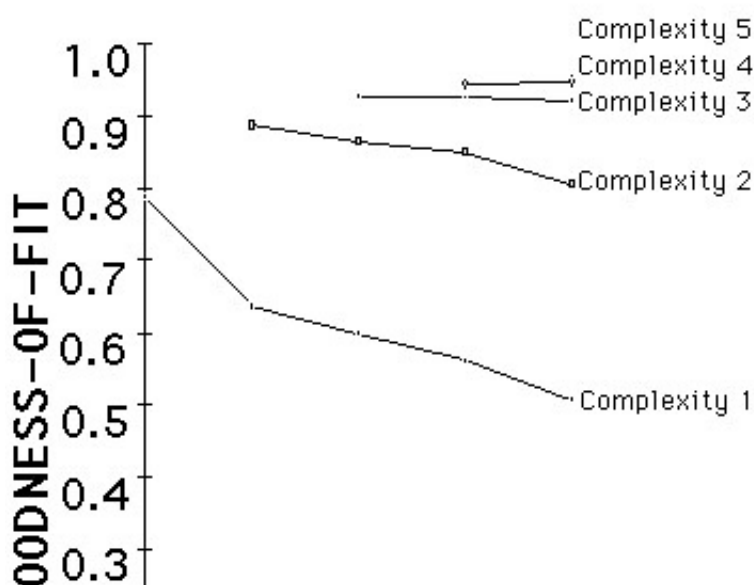


Figure 4

UNIPSATIZED INTREX VSS PLOT



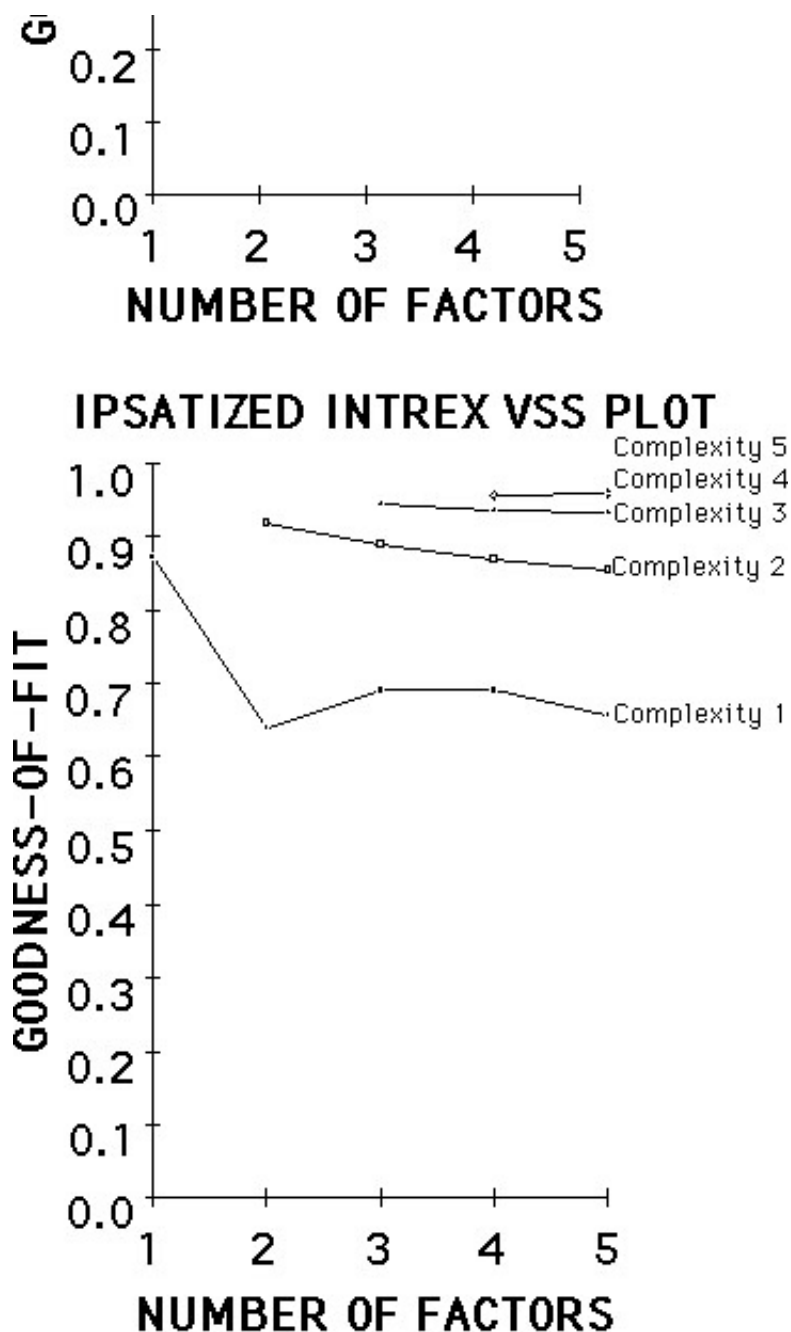


Figure 5

Notice that only the ipsatized IIP results have the characteristic circumplex pattern. The Intrex, however, in either ipsatized or unipsatized form, does not. The Intrex shows the pattern of a one-factor test. Since a necessary condition for a test to represent a circumplex is that it have two factors, the Intrex cannot be said to represent a circumplex.

DISCUSSION

The IIP shows a circumplex pattern only when it is ipsatized. Ipsatizing has the effect of removing the general factor. The IIP has a very large general factor that represents interpersonal problems. It is speculated that this construct may be very similar to that of neuroticism, factor IV of the Big Five. Since the domain of interpersonal relations is thought to cover only factors I and II of the Big Five, removing the general factor may seem warranted if one is interested in studying interpersonal theory. However, the reliability of the IIP is seriously diminished when the general factor is removed. Perhaps a more pure measure of power and affiliation, without the additional influence of

interpersonal problems, would provide a better operationalization of the Interpersonal Circle.

The Intrex shows a very large general factor that loads on every item. This general factor may also be considered an interpersonal problems factor, and may also be similar to the Big Five construct of neuroticism. However, ipsatizing does not leave a two-factor interpersonal circumplex in the Intrex, which is a one-factor test whether the data are ipsatized or not.

These results show that the circumplex structure of interpersonal variables proposed by interpersonal theory is measured by the IIP--only, however, after the factor accounting for the largest proportion of variance is removed. The Intrex, by contrast, is found not to represent a circumplex, contradicting the theoretical predictions of the SASB. Perhaps some other measure of the SASB dimensions needs to be developed if SASB theory is to be testable in the future. However, if the Intrex (which was theoretically derived item-by-item) is considered the only possible operationalization of the SASB, then SASB theory needs to be reconceptualized.

A revised SASB might come closer to a unidimensional construct of neuroticism than to a circumplex. Significantly, the SASB principle of complementarity does not rest essentially on the premise of circumplex structure, and could be generalized to operate in a one-dimensional simple structure as well. Whether this one dimension is neuroticism or not is a matter for future theory to answer.

REFERENCES

- Alden, L. E., Wiggins, J. S., & Pincus, A. L. (1990). Construction of circumplex scales for the Inventory of Interpersonal Problems. *Journal of Personality Assessment*, 55, 521-536.
- Benjamin, L. S. (1974). Structural analysis of social behavior. *Psychological Review*, 81, 392-425.
- Benjamin, L. S. (1993). *Interpersonal diagnosis and treatment of personality disorders*. New York: Guilford.
- Carson, R. C. (1969). *Interaction concepts of personality*. Chicago: Aldine.
- Horowitz, L. M., Rosenberg, S. E., Baer, B. A., Ureno, G., & Villasenor, V. S. (1988). The Inventory of Interpersonal Problems: Psychometric properties and clinical applications. *Journal of Consulting and Clinical Psychology*, 56, 885-895.
- Kiesler, D. J. (1983). The 1982 interpersonal circle: A taxonomy for complementarity in human transactions. *Psychological Review*, 90, 185-214.
- Leary, T. (1957). *Interpersonal diagnosis of personality*. New York: Ronald Press.
- Orford, J. (1986). The rules of interpersonal complementarity: Does hostility beget hostility and dominance, submission? *Psychological Review*, 93, 365-377.
- Revelle, W., & Rocklin, H. (1979). Very simple structure: An alternative procedure for estimating the optimal number of interpretable factors. *Multivariate Behavioral Research*, 14, 403-414.
- Sullivan, H. S. (1953). *The interpersonal theory of psychiatry*. New York: Norton.
- Wiggins, J. S. (1982). Circumplex models of interpersonal behavior in clinical

psychology. In P. C. Kendall & J. N. Butcher (Eds.), *Handbook of research methods in clinical psychology* (pp. 183-221). New York: Wiley.

Wiggins, J. S., Phillips, N., & Trapnell, P. (1989). Circular reasoning about interpersonal behavior: Evidence concerning some untested assumptions underlying diagnostic classification. *Journal of Personality and Social Psychology*, 56, 296-305.

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