Universität Bielefeld

SENSORY-PROCESSING SENSITIVITY – DIMENSIONAL OR CATEGORICAL VARIABLE?

A Taxometric Investigation

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Abstract Sensory-processing sensitivity (SPS) is a construct assumed to integrate some of the central traits of a number of major temperament theories. The corresponding theory is concerned with individual differences in processing sensory stimulation and postulates qualitative differences between SPS- and Non-SPS individuals. The empirical part of this study scrutinized the latent structure of the variable SPS: is SPS to be understood as a dimensional variable or rather as a taxon (i.e., as a class variable with the categories "Highly Sensitive" vs. "Other Individuals")? The items of the Highly Sensitive Person Scale were analyzed through the taxometric procedures L-Mode, MAXEIG, and MAMBAC in a sample of $N = 898$ participants. All three methods showed consistent taxonic results with an estimated base rate of 15-20% SPS class members.

I. Introduction

Sensory-processing sensitivity (SPS) is a construct assumed to integrate some of the central traits of a number of major temperament theories, e.g. Eysenck (1981, 1991), Gray (1991), Kagan (1994), Pavlov (1927),[1] Strelau (2008). By addressing the *subjective* perception of arousal, the corresponding theory explains the concepts of different arousal theories, using just one construct. SPS theory is concerned with individual differences in processing sensory stimulation and assumes qualitative differences between SPS- and Non-SPS individuals. The so-called Highly Sensitive Persons (HSPs) are conjectured to differ from other people in the way they process sensory information (Aron & Aron, 1997). They seem to be exceptional in that they perceive stimuli extremely intensely and in great detail, so that they easily suffer from overstimulation. On the other hand, HSPs are known to spot details and possibilities that others overlook.

This study focuses on the latent structure of the variable SPS. The question was whether SPS is to be understood as a dimensional variable or as a taxon, i.e., as a class variable with the categories "Highly Sensitive" vs. "Other Individuals".

II. Method

- **Sample:** $N = 898$ (73% female). Age range 10 to 83 years ($M = 36{:}1$; $SD = 14{:}3$). Mainly academic background, but more than 70% non-students; wide variety of professional areas and majors. Sampling via email (snowball system).
- **Measures:** Highly Sensitive Person Scale (31 items) + 24 socio-demographic items. Online survey on a website hosted by the university.
- **Method:** Taxometrics.
  - Applied procedures: L-Mode, MAXEIG, MAMBAC (software by Ruscio, 2010).
  - 3 different sets of indicators, consisting of 4 indicators each, composed of different items of the HSP Scale.
  - Base rate estimation via a series of L-Mode analyses (see Ruscio & Walters, 2009); comparison of empirical results with results from simulated taxonic comparison data sets with base rates of 5%, 10%, 15%, ..., 50%.
  - **Decision rules** (based on Comparison Curve Fit Index, CCFI):

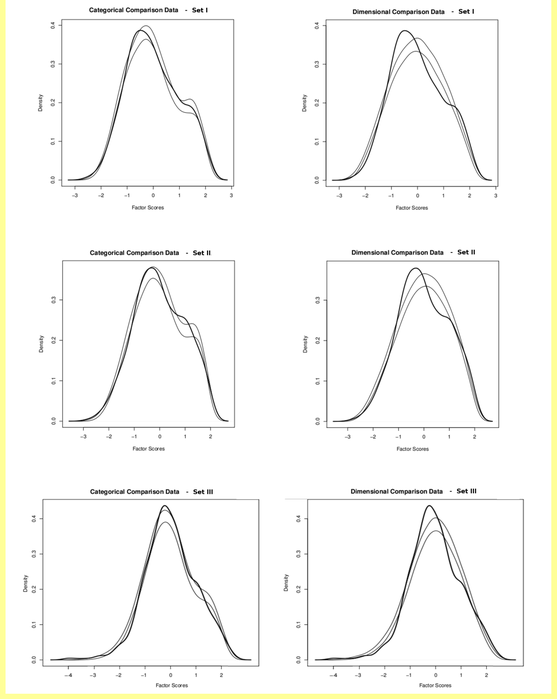
(1) If CCFI < .450, the data was considered dimensional; if CCFI > .550 the data was assumed to be taxonic. If .450 > CCFI <.550, the result was non-interpretable (reducing the risk of making wrong decisions).

(2) Within each of the three procedures (L-Mode, MAXEIG, MAMBAC), the mean CCFI of all three indicator sets was used – including non-interpretable results (conservative decision).

(3) The final decision "taxon vs. dimension" (or else "non-interpretable result") was based on the overall mean CCFI of all three procedures.

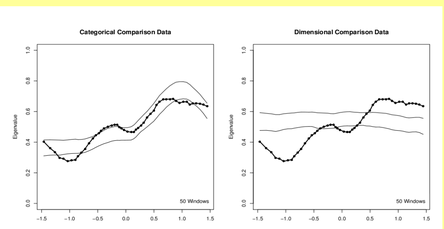
III. Results

With CCFI values > .550, all three procedures showed consistent taxonic results. Base rate estimations varied from 17.5 to 47.4%.



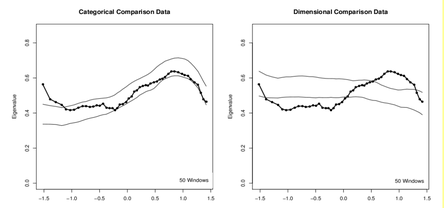
- **L-Mode: taxonic results**

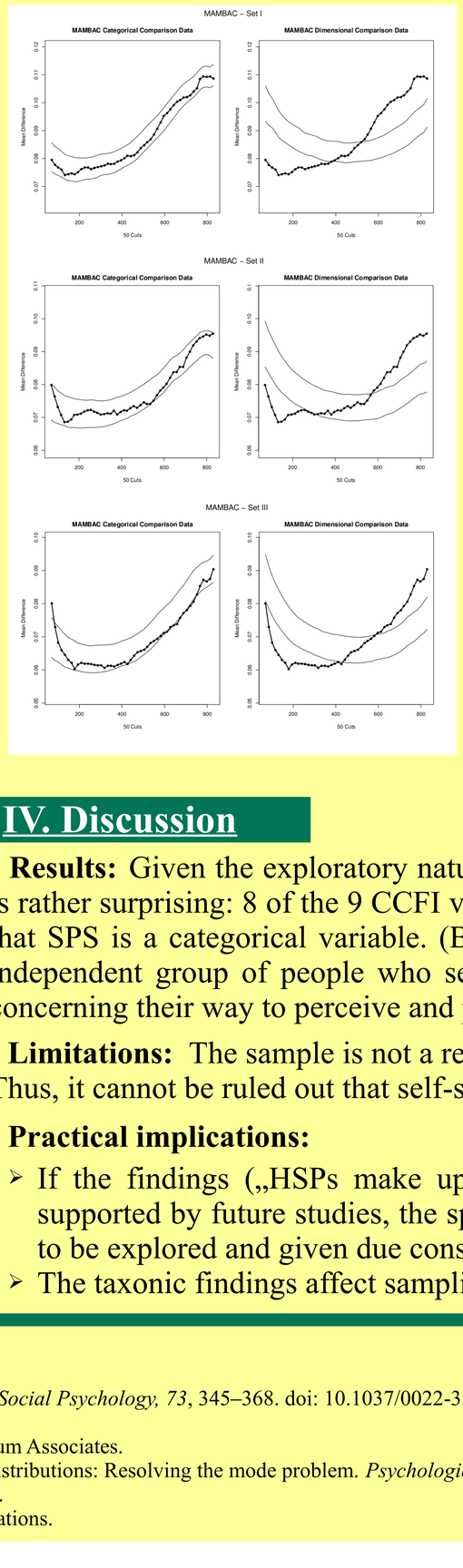
Figure 1. L-Mode results for the three indicator sets. *Bold line: empirical data. Thin lines: +/- 1 SD from the mean results of the comparison data. Left: Taxonic comparison data with a base rate of 17.5%. Right: Dimensional comparison data.*

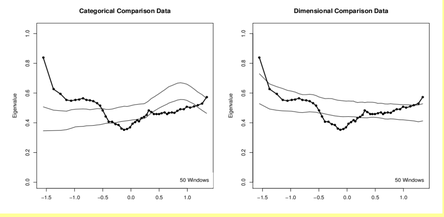


- **MAXEIG: mainly taxonic results**

Figure 2. MAXEIG results for the three indicator sets*. Left: Taxonic comparison data with a base rate of 17.5%; Right: Dimensional comparison data. Bold line: mean of the empirical data. Thin lines: +/- 1 SD from the mean results of the comparison data.*







- MAMBAC: **taxonic results**

Figure 3. MAMBAC results for the three indicator sets*. Bold line: mean of the empirical data. Thin lines: +/- 1 SD from the mean results of the comparison data. Left: Taxonic comparison data with base rate of 17.5%. Right: Dimensional comparison data.*

L-Mode	P	CCFI	Ø CCFI
Set I	17.5%	.776	
Set II	17.5%	.665	
Set III	17.5%	.657	
			.699

MAXEIG	P: M	P: SD	P: Span	CCFI	Ø CCFI
Set I	30.5%	10.6	19.1 – 40.4	.747	
Set II	44.0%	22.4	31.1 – 77.5	.695	
Set III	63.0%	24.6	26.6 – 78.1	.382	
					.608
MAMBAC					
Set I	41.5%	6.3	24.0 – 47.3	.905	
Set II	45.2%	4.6	37.2 – 50.0	.820	
Set III	47.4%	9.3	35.3 – 64.7	.724	
					.816

Table 1. Results from different taxometric procedures*: Mean base rate estimations and CCFI values for three indicator sets. Ø CCFI: mean CCFI of all three sets.*

IV. Discussion

- **Results:** Given the exploratory nature of the study, the uniformity of the results is rather surprising: 8 of the 9 CCFI values indicate taxonicity, providing evidence that SPS is a categorical variable. (Boldly spoken: HSPs do exist; they form an independent group of people who seem to be qualitatively distinct from others concerning their way to perceive and process stimuli.)
- **Limitations:** The sample is not a representative general population sample. Thus, it cannot be ruled out that self-selection effects may have biased the results.
- **Practical implications:**
  - If the findings („HSPs make up at least 15% of the population") will be supported by future studies, the specific needs of this minority of people need to be explored and given due consideration.
  - The taxonic findings affect sampling, study design and scale development.

[1] According to Aron and Aron (1997).

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