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**Need-supportive behavior as reported by teacher vs.
need-supportive behavior as perceived by students: does
the congruence matter? - A Multilevel Response Surface
Analytical Approach**

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1. INTRODUCTION

The quality of relationships between teachers and students is considered as an important source of student motivation and well-being (e.g., Hospel & Galand, 2016; Orkibi & Ronen, 2017; Ryan & Deci, 2017; Tian et al., 2014)

As students often rely on teachers support to improve their self-perception, motivate them and to participate in class, the quality of the students' academic experience is highly dependent on how they perceive their teacher as a supportive figure.

Research on interpersonal behaviors has traditionally relied on a one-way perspective either to determine how the interpersonal behavior of a person in a leadership position (i.e., a teacher) relates to a given outcome, or to examine the effects of the teachers' interpersonal behaviors from the students' perspective.

Recently, Rocchi and Pelletier (2018) raised an important limitation to the use of these linear approaches by pointing out that self-reported use of interpersonal behaviors from a person in a leadership position isn't necessarily aligned with others' perception of this behavior. Research has indeed revealed that teachers and their students may differ in their perception of the same behavior.

Another limitation is that when teachers report their interpersonal behaviors, they usually report how they behave in general, and not in terms of how they behave with each of their students individually. This can be problematic because their perception of their behavior in general may not be representative of how they interact with each unique individual.

2. OBJECTIVES & HYPOTHESES

Moving beyond one-way perspectives of interpersonal behavior and incorporating both students' perception (SP) and teachers' perception (TP) to better understand the role of need supportive behavior (NSB) and its relationship with positive valence outcomes (performance, autonomous motivation and self-perception) and negative valence outcomes (controlled motivation, amotivation and anxiety) by:

Exploring the level of agreement effect

- H1: Positive valence outcomes would be higher whereas negative valence outcomes would be lower when students' perception align with teachers' perception at high level of NSB than at low level.

Exploring the direction of disagreement effect

- H2: Positive valence outcomes would be lowered whereas negative valence outcomes would be maximized in case of negative disagreement (i.e., when students' perception of NSB < teachers' perception of NSB) than in case of positive disagreement (i.e., when students' perception of NSB > teachers' perception of NSB).

Exploring the degree of disagreement effect

- H3: Positive valence outcomes would be lowered and negative valence outcomes would be maximized as students' perception and teachers' perception become increasingly discrepant

3. METHOD

Participants

A sample of 30 teachers (24 females; $M_{age} = 47.25 \pm 8.9$) and 887 French students (female = 446; male = 441; $M_{age} = 11.13 \pm 0.49$).

Measures

Need-supportive behavior : *Learning Climate Questionnaire* (Black & Deci, 2000 ; Williams & Deci, 1996).

Motivation : *Academic Self-Regulated Questionnaire* (Ryan & Connell, 1989).

Perceived competence : *Self-Description Questionnaire II* (Marsh, 1988).

Academic performance : test that reviewed the objectives outlined in the mathematics curriculum for the school year ($M = 11.04 \pm 4.62$).

Data analysis strategy

Multilevel Polynomial Regression and Response Surface Analysis (Edwards, 1994, 2002; Edwards & Shipp, 2007; Humberg et al., 2018, 2019; Nestler et al., 2015, 2019; Schönbrodt, 2016; Shanock et al., 2010).

- 1st step : Polynomial regression model :

$$\text{outcome} = b_0 + b_1SP + b_2TP + b_3SP^2 + b_4SP*TP + b_5TP^2 + e$$

where the outcome is regressed on the predictor SP and TP, their respective squared terms SP^2 and TP^2 , and their interaction $SP*TP$

- 2nd step : the regression coefficients (b_1 to b_5) are transformed into four surface parameters (a_1 to a_4).

These surface parameters are used to examine how the degree of agreement/disagreement and the direction and degree of disagreement between SP and TP is related to the outcome.

- 3rd step : the agreement and disagreement effect can be examined by a visualization of the estimated regression equation in a three-dimensional plot

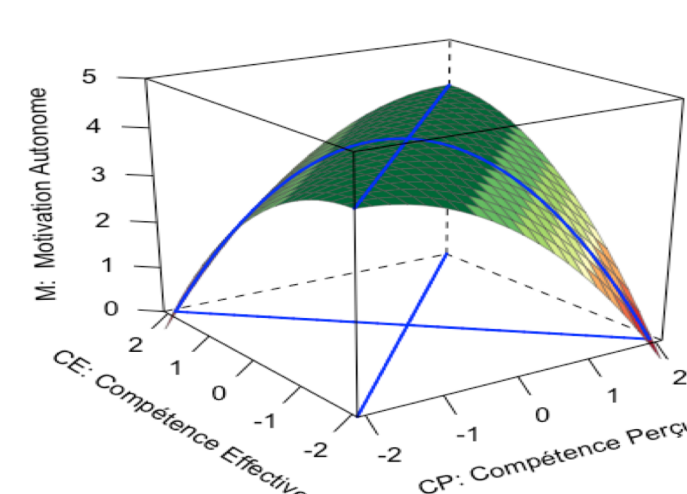


Fig.1. Illustration of the response surface

Table 1. Interpretation of the response surface parameters

Parameters	Formula	Meaning
a_1	$b_1 + b_2$	Linear effect of the level of alignment between SP and TP on the outcome
a_2	$b_3 + b_4 + b_5$	Nonlinear effect of the level of alignment between SP and TP on the outcome
a_3	$b_1 - b_2$	Effect of the direction of disagreement between SP and TP on the outcome
a_4	$b_3 - b_4 + b_5$	Effect of the degree of disagreement between SP and TP on the outcome

4. RESULTS

Table 2. Correlations across study variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Students' perception of NSB	—							
2. Teachers' perception of NSB	.03	—						
3. Performance	.07	-.01	—					
4. Autonomous Motivation	.41 ***	-.04	.14 ***	—				
5. Controlled Motivation	.08 *	.07 *	-.11 **	.19 ***	—			
6. Amotivation	-.23 ***	.07 *	-.13 ***	-.48 ***	.07 *	—		
7. Perceived competence	.29 ***	-.12 ***	.58 ***	.49 ***	-.04	-.37 ***	—	
8. Anxiety	-0.07 *	.14 ***	-.35 ***	-.08 *	.14 ***	.11 ***	-.43 ***	—

Table 3. Frequencies of predictor agreement and disagreement

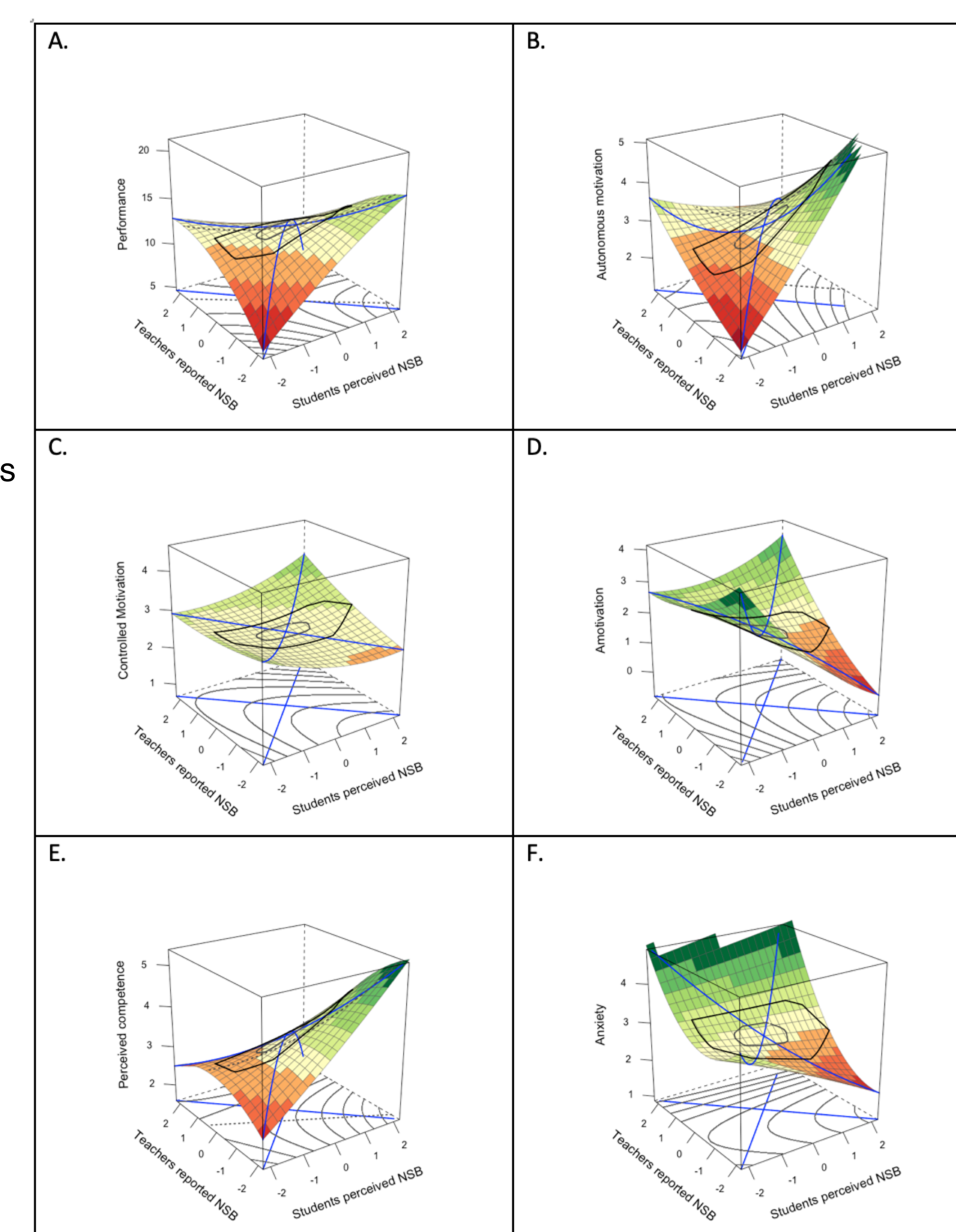
NSB Group	%
Negative disagreement : SP NSB < TP NSB	33
Agreement : SP NSB = TP NSB	29
Positive disagreement : SP NSB > TP NSB	37

Note: SP NSB = Students' perception of need-supportive behavior; TP NSB = teachers' perception of need-supportive behavior; Negative disagreement = students displayed lower scores of NSB compared with teachers' perception; agreement = students and teachers perception of interpersonal NSB were similar; positive disagreement = students displayed higher scores of NSB compared with teachers' perception

Table 4. Surface values test for the polynomial regression models

	Performance	Autonomous motivation	Controlled motivation	Amotivation	Perceived competence	Anxiety
Constant	12.93***	3.09***	2.64***	1.64***	3.47***	2.87***
SP (b_1)	.42**	.46***	.008	-.40***	.27***	-.12*
TP (b_2)	-.49	-.15	.12	.24	-.39*	.63**
SP^2 (b_3)	-.15	.04	.06	.10*	.02	.004
$SP*TP$ (b_4)	-.98*	-.30**	.08	.27*	-.20*	.15
TP^2 (b_5)	-.43	.03	.02	.10	-.11	.23
R^2	0.004	0.10	—	.08	.06	.02
-2 Log L	4637.0	2346.4	2091.4	2527.9	2247.4	2940.4
$a_1 = (b_1 + b_2)$	-.08	.32	.13	-.14	-.11	.51*
$a_2 = (b_3 + b_4 + b_5)$	-1.56	-.23	.16	.47	-.29	.38
$a_3 = (b_1 - b_2)$.92	.62**	-.12	-.64**	.66***	-.76***
$a_4 = (b_3 - b_4 + b_5)$.40	.38	.001	-.08	.10	.08

Note: SP= Student perception; TP = teachers perception; SP*TP= Student perception/teachers perception interaction term; SP^2 = Student perception quadratic term; TP^2 = Teachers perception quadratic term; b_1 to b_5 are the unstandardized regression coefficients. RP refers to the percentage of outcome variance explained; *p<.05. **p<.01. ***p<.001.



5. DISCUSSION

The present study underscores the importance of exploring how students' and teachers' perception of NSB are related to positive and negative outcome in the academic domain. The findings deepen our understanding of how the agreement or disagreement between students' and teachers' perception impact on student academic experience. It extends the findings from previous research on self and other ratings by jointly considering the multilevel effect of teachers' and students' perception

The results highlight the importance of :

- positive disagreement as a clear indicator of higher positive valence outcomes (autonomous motivation and perceived competence) and lower negative valence outcomes (amotivation and anxiety).
- negative disagreement as a clear indicator of higher negative outcome and lower positive outcome.

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