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Assessing the Experience of Autonomy in New Cultures and Contexts

Guy Roth · Avi Assor · Yaniv Kanat-Maymon · Haya Kaplan

Abstract This research demonstrates the usefulness of the technique of Smallest Space Analysis (SSA) in the construction of indices of the experience of autonomy, a central construct in Ryan and Deci's self-determination theory of motivation and personality (SDT, 2000) and a construct central to recent controversies on socialization in different cultures. We propose that SSA has two advantages in comparison to correlation tables in the assessment of the experience of autonomy. First, it allows easy identification of items that best capture the various motivations along the relative autonomy continuum postulated by SDT. Second, and more important, it can reveal data patterns that might contribute to theoretical refinement that otherwise might remain unnoticed. These advantages were demonstrated in three Israeli samples: two samples of elementary school children ($n = 697$ and $n = 417$), and one sample of high school students ($n = 317$). Discussion considers ways in which SSA can contribute to the development and refinement of measures and theory pertaining to the experience of autonomy in cultures and contexts not examined so far.

Keywords Motivation · Autonomy · Smallest space analysis

A central issue for theories of motivation is the distinction between *internal* and *external* Perceived Locus of Causality (PLOC). de Charms (1968) described *internal* PLOC as the experience of being the "origin" of one's behavior. In contrast, in external PLOC, one feels like a "pawn" whose plight is completely at the mercy of heteronomous forces.

G. Roth (✉) · A. Assor · Y. Kanat-Maymon · H. Kaplan
Department of Education, Ben-Gurion University of the Negev,
P.O. Box 653, Beer-Sheva 84105, Israel
e-mail: roth@bgu.ac.il

The distinction between *internal* and *external* PLOC has since become crucial for studies of *intrinsic* versus *extrinsic* motivation and of perceived autonomy (Deci & Ryan, 1985; Ryan & Connell, 1989).

Self-determination theory (SDT: Deci & Ryan, 1985; Ryan & Deci, 2000) expanded on de Charms' perspective and suggested three additional types of motivation that are extreme in terms of both control or coercion and perceived autonomy and thus that fall between the classic forms of extrinsic motivation (coercion and seduction) and intrinsic motivation (a high level of autonomy). The various types of motivation postulated by SDT were viewed as occupying different points on a relative autonomy continuum, which ranges from coercion to autonomy.

Based on this conception, Ryan and Connell (1989) developed scales assessing four of the five motivations they posited. They also created an overall indicator of perceived autonomy by giving positive weights to autonomous motivations and negative weights to controlled motivations. This measure, often termed the Relative Autonomy Index (RAI) is in widespread use and has been found to be related to many important correlates. For example, the RAI has been found to be associated positively with desirable outcomes and negatively with undesirable outcomes in domains as varied as politics, student functioning, religion, health care, and aging (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Koestner, Losier, Vallerand, & Carducci, 1996; O'Connor & Vallerand, 1990; Vallerand et al., 1993; Williams & Deci, 1996; Williams, Grow, Freedman, Ryan, & Deci, 1996).

Measures of relative autonomy exist in several languages and in many life-domains and contexts, although there is a need to develop such measures in still other languages to be used in additional cultures and in other life domains or contexts. Because of SDT's claim that the experience of autonomy is essential for optimal well-being in all cultures

(e.g., Chirkov & Ryan, 2001), a point that has been somewhat controversial (e.g., Iyengar & Lepper, 1999; Markus & Kitayama, 2003), it is important that research on the RAI be done in various other cultures.

In view of the need for additional versions of the RAI measure, the major purpose of the present research is to present a method—Smallest Space Analysis (SSA)—that appears to be particularly useful in the development of such new measures. Accordingly, the purpose of the current research is to describe the advantages of SSA (Guttman, 1968; Maslovaty, Marshall, & Alkin, 2001; Shye, Elizur, & Hoffman, 1994) for the exploration of the relative autonomy continuum as posited by SDT. Three studies were conducted to demonstrate the advantages of SSA in constructing new RAI measures. We begin with the conceptualization and measurement of the relative autonomy continuum and then discuss the advantages of SSA for the exploration of this continuum.

Perceived relative autonomy: Conceptualization

SDT posits five types of perceived motivations or regulation that, operationally, may be defined as five different reasons for engaging in a specific behavior. The five motivational types can be placed along a continuum of autonomy. The least autonomous motivation is termed *external*. Behavior so regulated is controlled by *external* contingencies involving threats of punishments or the offering of material rewards rather than being enacted volitionally (Ryan & Connell, 1989). The behaviors persist only when the contingencies are present and this type of motivation has been associated with poor adjustment and ill-being (Grolnick & Ryan, 1989).

Next along the autonomy continuum is a motivational type termed *introjection*. In this type of motivation, behavior is controlled by the desire to avoid feeling guilty, ashamed, or unworthy, as well as the striving for highly positive evaluations (e.g., pride and self-esteem). Although in introjected motivation the enactment of behavior is not dependent on specific external contingencies, introjected regulation is still considered relatively controlled (rather than autonomous) because people still feel that they are acting because they have to and not because they want to (e.g., Assor, Roth, & Deci, 2004).

The next motivational type is referred to as *identified*, and is considered relatively autonomous because the person has accepted the value of the activity as his or her own. Identified regulation results from identifying with the importance of the behavior vis-a-vis one's personal values and goals. The next motivational type—*integrated*—results from reciprocally assimilating the identifications with other aspects of one's self. Both *identified* and *integrated* motivations are considered relatively autonomous, and when so regulated, people experience a sense of self-determination.

The most autonomous motivation is termed intrinsic. Pure *intrinsic* motivation involves engaging in an activity out of interest in the activity itself and is characterized by enthusiasm, spontaneity, excitement, concentration, and joy. Research has shown that the identified, integrated, and intrinsic forms of motivation are accompanied by the experience of choice, rather than by pressure, and is accompanied by proactive coping and well-being (Grolnick & Ryan, 1989; Ryan, Rigby, & King, 1993).

To summarize, the SDT model of motivation proposes five motivation types reflecting different levels of coercion versus autonomy. The overall measure (viz., the Relative Autonomy Index - RAI) is based on the hypothesized continuum of autonomy along which the different levels of motivation are placed. In other words, the positive and negative weights given to the autonomous and controlled motivations, respectively, are based on the hypothesized ordinal scale (continuum) produced by the different motivation types.

Perceived relative autonomy: Measurement

Ryan and Connell (1989) assessed four of the five types of motivations posited by SDT (external, introjected, identified and intrinsic) by asking students to indicate the reasons for their actions in two domains: academic achievement and prosocial behavior. External reasons were those where behavior was explained by reference to external authority, fear of punishment, or rule compliance. *Introjected* reasons were framed in terms of internal, esteem-based pressures to act. Identified motivation was captured by reasons involving acting from one's own values or goals. Finally, *intrinsic* reasons for action refer to behavior undertaken for its inherent interest and enjoyment.

Ryan and Connell (1989) expected a simplex-like pattern of correlations among the four types of motivations. They derived the simplex concept from Guttmann's radex theory (1954), which describes ordered relations between correlated variables. In a simplex structure, the magnitude of the correlations among variables reflects their conceptual similarity. That is, the greater the conceptual similarity between two variables, the higher is the correlation between them. Therefore, if you order the variables included in a table of correlations according to their expected conceptual similarity, you should obtain a correlation table in which the largest correlations appear on a diagonal representing the correlations between adjacent conceptual categories.

Ryan and Connell (1989) found a perfect simplex model, with the largest correlations being between adjacent conceptual categories (motivation types) and the correlations tapering off as the categories become more distant. This finding provides the justification for the weighting system on which the RAI is based.

In order to develop an RAI referring to academic motivation based on the four categories of reasons, Ryan and Connell developed items with reasons for engaging in academic tasks. Each stem describing an academic task (for example: "I do my homework because") was followed by four reasons, one for each motivation category (external, introjection, identification, and intrinsic). With regard to each of the four categories, the items' inter-correlations were computed and inspected for the hypothesized simplex like patterns of correlations. Reasons (items) that fit within the general simplex pattern were examined further, and reasons that did not result in an adequate simplex-like pattern were discarded. To do this appropriately, the inter-correlations between all the items should be computed and the simplex-like pattern should be inspected for each group of four items (one item from each type of motivation). In their pilot study, Ryan and Connell (1989) used 34 items that were reduced to 26 as a result of the screening process. Simple calculation tells us that doing so while using a correlations table of 34 items would result in the inspection of 561 inter-correlations. No doubt, this is a demanding task that does not allow a simultaneous observation of the interrelations among all the variables. It seems that simultaneous deployment of all variables in terms of their interrelations would be valuable both technically and theoretically for examining the relations among the items from the different subscales. We turn now to a discussion of these issues while describing the utility of the SSA method.

The advantages of smallest space analysis in the exploration of the relative autonomy continuum

SSA (Guttman, 1968; Shye et al., 1994) is one of the most common techniques for multidimensional scaling (MDS) aimed at understanding the structure or pattern of a matrix by displaying the structure geometrically (Shye et al., 1994). SSA maps the location of each variable (item) in a multidimensional space. Each variable is represented as a point in Euclidian space. The distances between the points reflect the empirical relations among the items, as measured by the correlations between them. The higher the correlation between two items the closer they are in the space (Guttman, 1968; Maslovaty et al., 2001). Hence, SSA results that support the hypothesized continuum of autonomy will be expressed in the order of the items in the multidimensional space. The prediction is as follows: The items that represent the external motives will fall at one end of the space, next to them the *introjection* items, then the *identified* reasons for action, and finally the items that measure the *intrinsic* motives will fall at the other end of the multidimensional space.

Viewing PLOC through such a model maintains the advantages of the simplex approach used by Ryan and Connell

(1989) over traditional Factor Analytic (FA) approaches. First, it manifests the underlying parameter along which they are arranged. In this case, there are four categories of reasons for action, each with unique characteristics that are hypothesized to lie along a continuum of autonomy. In addition, it avoids the typical approach of contrasting *external* versus *internal* ends of a continuum while ignoring intermediate levels that have relevance to that continuum. Often, with the traditional FA approach, a two-factor solution has been found with a first factor anchored at the internal end and a second factor anchored at the external end of the PLOC continuum. This approach ignores intermediate levels that are theoretically of interest. Moreover, it is important to note that, even when a four factor solution (one for each PLOC category) has been found in a specific sample, no information is provided on the way the four factors relate to one another. That is, the hypothesized sequence from external to internal locus of causality cannot be tested based on the FA approach.

Furthermore, it seems that SSA has two main advantages over the use of inter-correlations between items for the exploration of the self-determination continuum. First, SSA allows simultaneous observation of the interrelations between variables. Developing an RAI in new domains and cultures entails empirical exploration that involves identification of items that best capture the various types of motivations along the RAI continuum, as well as items that do not fit with the hypothesized motivations and continuum. It seems that it would be more efficient to locate appropriate and inappropriate items when the items are presented simultaneously instead of tracking them one by one as has to be done while using large correlation tables.

A second advantage of SSA is that it can contribute to theory refinement and development. The items' deployment picture (map) derived from SSA can often reveal patterns in the data that might otherwise remain obscure and further is much easier to interpret than a table of coefficients (Friedman, 1999). Thus, it may help to detect new conceptual categories or subcategories that might be valuable theoretically in a specific domain or culture.

For example, in several studies (Kaplan, Eilot, Assor, & Roth, 2005; Patrick, Skinner, & Connell, 1993; Ryan & Connell, 1989) the external locus of causality was measured by items concerned with expectation of rewards or punishments (". . . So that the teacher won't yell at me"), and other items that describe conformity (". . . Because that's the rule"). Although these items share a common essence, which is an attribution of the cause of behavior to an external source, they might be seen as two sub-categories. The first sub-category relates to specific authority that gives rewards or punishes while the second sub-category involves compliance with general rules rather than with a specific authority. It seems reasonable to assume that compliance with

general rules (not involving a specific authority who offers a reward or threatens a punishment) may involve a weaker *experience of external* compulsion than compliance due to the expectation of threats coming from a specific authority (parent, teacher, principal, etc.). Moreover, compliance with rules might be accompanied by a sense of *internal* compulsion, which is an index of *introjection*. Thus, it is suggested that conformity with rules and norms may serve as an intermediate level between pure *external* control and *introjection*. That is, one might obey an external rule or norm because of a strong internal feeling that one must do so (otherwise one might be disliked by members of one's reference group and thus feel worthless—a phenomenon that characterizes *introjection*), and at the same time one might be afraid of an external social sanctions involving loss of various privileges. This hypothesized intermediate level will be supported by an SSA map that shows the conformity items to fall between the *external* and the *introjection* items. This kind of theoretical exploration might be overlooked while using correlations for the exploration of a simplex pattern. These two advantages of SSA over tables of correlations are exemplified by three studies.

The current studies

In this article, three studies are presented. Two of them explore the PLOC for students' academic effort in class and the third explores the PLOC for elementary school students' effort investment in specific interest domains in which the students choose to participate. The school staff offered these interest domains as part of an educational intervention carried out in collaboration with the authors.

Study 1: PLOC regarding academic effort among high school students

Method

The sample consisted of 317 high school students from three schools in Israel (156 boys and 161 girls) in grades 9 and 10. The mean age was 15.9 ($SD = .93$) for boys and 16.0 ($SD = .91$) for girls. According to the classification of the Israeli Ministry of Education, these schools serve populations that are mostly middle class or lower middle class. Students completed questionnaires assessing their PLOC regarding academic effort in class. The questionnaire also assessed several other variables unrelated to this research. Research assistants with special permission to work with children administered the students' questionnaire when teachers were not present in the classroom. Students indicated their responses to the various items using a 5-point scale extending from very true to not at all true. The research was approved by the IRB in Ben-Gurion University and by the Israeli

Ministry of Education. Parental consent was gained according the guidelines of the Ministry of Education.

Instruments

Examination of PLOC was based on students' self-reported reasons for engaging in typical academic behavior like doing homework, participating in class discussions, doing class assignments, etc. As noted earlier, four PLOC categories were examined: External, Introjection, Identified, and Intrinsic.[1] The Hebrew items are similar to the items developed by Ryan and Connell (1989).

Twenty-eight items were administered, seven items for each category. Using initial SSA, seven items were discarded because of their inadequacy in relation to the relative autonomy continuum. Discarding items was done based on the location of an item in space. For example, a posteriori introjected item that empirically overlapped with an external items (shared the same space with part of the external items) was discarded because of lack of discernment (equivalent to cross loading in traditional FA). As a result, the final scales included five items for the *external, introjection and identified* categories, and six items for the intrinsic category. It is important to note that two out of the five external items measure conformity while the other three items measure a purely *external* locus of causality. The items are presented in the Appendix.

Although the main goal of the current research was to demonstrate the advantage of SSA in the exploration of the relative autonomy continuum and not the construct validity of this measure, we also used a scale of positive emotions in classes as an external variable. It seems that correlations of the four PLOC categories with an external measure are important because SSA can shed light only on the internal structure of a construct. Based on SDT the prediction is that the four PLOC categories would correlate with *positive emotions in teacher's class* in a way that replicates the simplex pattern. That is, external reasons for engagement in class would have low correlation with positive emotions and this correlation would increase while moving along the continuum to introjected identified and intrinsic regulations. The measure of positive emotions in the classroom was based on Assor et al. (2005) and includes four items (e.g., "In this teacher's class I feel at ease"; "In this teacher's class I feel nervous"—reversed score).

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[1] Integrated motivation was not examined because the participants were young enough that one would not expect much integrated motivation, because it is difficult to distinguish between identified and integrated motivations using self-reports, and because most past work has not distinguish between those levels (e.g., Blais, Lachance, Vallerand, Briere, & Riddle, 1993; Pelletier, Seguin-Levesque, & Legault, 2002; Ryan & Connell, 1989).

Fig. 1 SSA of high school students' PLOC scores regarding class assignments. *Notes.* *Each number in the diagram represents an item (items are presented in the Appendix). *The conformity items are in frames
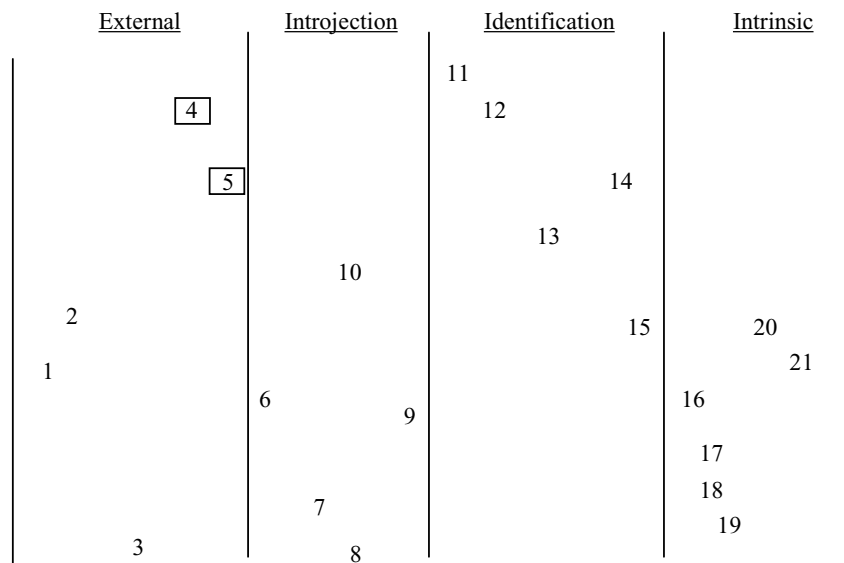
Results and conclusions

The data were subjected to SSA using the Hebrew University Data Analyses Package (HUDAP; Shye, 1991). The SSA of two-dimensional[2] space solution yielded a coefficient of alienation of 0.17. The alienation coefficient ranges from 0.00 to 1.00, where the highest value indicates the poorest match between the initial correlation matrix and the SSA map. A value between 0.00 and 0.20 is considered an indicator of a good match (Guttman, 1968).

Figure 1 presents the final items map; inspection of the figure indicates that, as expected, high school students differentiated among the four PLOC categories. Items representing the different types of motivations are perfectly separated in Fig. 1 by straight lines. The non-arbitrary nature of those lines is supported by their theoretical origin. Furthermore, each set of theoretically distinct items fell at its expected location along a horizontal continuum that appears to represent the relative autonomy continuum proposed by Ryan and Connell (1989).

As was described earlier, identifying the items that fit the relative autonomy continuum using correlations table as was done in the past is a cumbersome task. With the initial 28 items that are divided into 7 items per category (extrinsic, introjection, identified and intrinsic) one must inspect 378 correlations and 2,401 combinations of 4 items, one from each PLOC category. It seems that the simultaneous deployment of the items in terms of their inter-correlations, as presented in Fig. 1, is much more efficient.

As has been suggested, one of the advantages of SSA is its ability to distinguish new categories and sub-categories using the deployment of the items that reflects the inter-correlations between the items. Although the two items that measure conformity (items 4 and 5, presented in frames in the figure) can be seen as part of the *external* reason category, they are somewhat separated from the other three items that measure *external* control. Moreover, two straight lines can be drawn to separate the two conformity items, and create an intermediate level of *conformity* between the *external* and *introjection* categories. It seems that these results give support to the hypothesis regarding the notion of conformity as an intermediate level of PLOC between the *external* and the *introjection* levels.

Internal consistency of the scores was measured by the Cronbach alpha coefficient and indicated moderate to high levels of internal consistency. The alphas were .67, .74, .74, .83 for external, introjected, identified, and intrinsic, respectively. Given the two sub-categories that underlie the external regulation category, it should not be a surprise that external was found to be the least reliable construct. This relatively low reliability is reflected in the SSA map by the gap between the external and the conformity items. Table 1 presents a perfect simplex pattern of correlations among the four categories. The correlations were computed between the categories' mean scores that were calculated for each participant based on the category's items that resulted from the SSA.

Finally, the correlations of the four PLOC categories with positive emotions in the classroom were calculated. The findings are in line with our predictions and replicate the simplex pattern. Thus, the lowest correlation is between

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[2] Although our hypothesis describes one dimension, which is the relative autonomy continuum, we preferred to analyze two dimensions because it allows inspection of the items' deployment within with respect to both the PLOC dimension and another dimension that might emerge and be relevant. One-dimensional analysis was also conducted and revealed the same pattern of results, with an adequate alienation coefficient.

Table 1 Simplex-like pattern of correlations among the four PLOC categories for doing class work (high school students)

	External	Introjection	Identification	Intrinsic
External	–			
Introjection	.41**	–		
Identification	.27**	.44**	–	
Integration	.14**	.40**	.54**	–

*$p < .05$; **$p < .01$.

external regulation and positive emotion ($r = -.07$; n.s.). The correlations gradually increase while moving along the continuum of relative autonomy to introjected ($r = .07$; n.s.), identified ($r = .32; p < .01$), and intrinsic regulations ($r = .36; p < .01$).

Study 2: PLOC regarding academic effort among elementary school students

Methods

The sample consisted of 697 Israeli elementary school students from four schools (343 boys and 354 girls) in 4th and 6th grades. The mean age was 11.0 ($SD = 1.25$) for boys and 10.9 ($SD = 1.19$) for girls. According to the classification of the Israeli Ministry of Education, these schools serve populations that are mostly middle class or lower middle class. The procedures for this project were very similar to those described in Study 1.

Instruments

The PLOC measure was also similar to the measure that was described in the first study: 28 items were administered, with seven items for each category. Using initial SSA, 10 items were discarded because of their inadequacy to the relative autonomy continuum. As a result, the final scales included five items for external and introjection categories, and four items for identified and intrinsic categories. As in the first study, two out of five items of the external locus of causality category measured conformity with rules and norms. The final scales are presented in the Appendix.

As was done in the first study, we used the same measure of *positive emotions in the classroom* for validation purposes.

Results and conclusions

Figure 2 presents the final items map produced by SSA using two dimensions, after screening of items that did not fit the hypothesized continuum (the item numbers in the Figure corresponds to the item numbers in the Appendix). Inspection of Fig. 2 indicates that, as expected, elementary school students differentiated among the four PLOC categories. This

conclusion is supported by a satisfactory alienation coefficient of 0.07. Thus, each set of theoretically distinct items could be separated from other items by straight lines. The non-arbitrary nature of those lines is supported by their theoretical origin. Moreover, the four groups of items fall along a diagonal[3] that appears to represent the relative autonomy continuum proposed by Ryan and Connell (1989).

In accordance with the findings of the first study, the SSA results support the hypothesis regarding the possibility of a new sub-category that is hypothesized to fall between the *external* and the *introjection* categories on the perceived locus of causality continuum. As can be seen in Fig. 2, the two items that measure conformity to rules and norms (items 4 and 5, presented in frames in the figure) are somewhat distinct from the three items that measure pure external contingencies and somewhat closer to the *introjection* items. Two straight lines can be drawn to separate the two conformity items in order to create an intermediate level of *conformity* between the *external* and *introjection* categories on perceived locus of causality.

Internal consistency of the scores on the four reason categories varies from moderate to high levels of internal consistency. The alpha coefficients were .70, .76, .80 and .86 for external, introjected, identified, and intrinsic regulations respectively. As in the first study, the external category has the lowest reliability coefficient. Table 2 presents a perfect simplex pattern of correlations among the four categories. The correlations were computed between the categories' mean scores calculated for each participant based on the category's items resulting from the SSA.

Finally, the correlations of the PLOC categories with positive emotions in the classroom were calculated. As was found in the first study, the pattern of the correlations confirms our hypothesis. Thus, the lowest correlation was between external regulation and positive emotions ($r = .00$). The correlations increase gradually while moving along the relative autonomy continuum to introjected ($r = .10; p < .01$), identified ($r = .38; p < .01$), and intrinsic ($r = .51; p < .01$).

In sum, SSA results indicate that high school and elementary school students differentiate between the four PLOC categories. The deployment of the items in space supports the notion of a relative autonomy continuum that ranges from external locus of causality to internal locus of causality. The results seem to support the hypothesized sub-category of PLOC, in which conformity to rules and norms might be placed between the external and the introjection locus of causality.

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[3] SSA is based on regionality, which is coordinate-free or independent of choice of references axes. Instead, it is dependent on an a priori facet design of content. Thus, dividing the space horizontally or diagonally makes no difference as the division of the space is based on theoretical considerations (Guttman, 1982; Schlesinger & Guttman, 1969).

Fig. 2 SSA of elementary school students' PLOC regarding class assignments. *Notes.* *Each number in the diagram represents an item (items are presented in the Appendix). *The conformity items are in frames
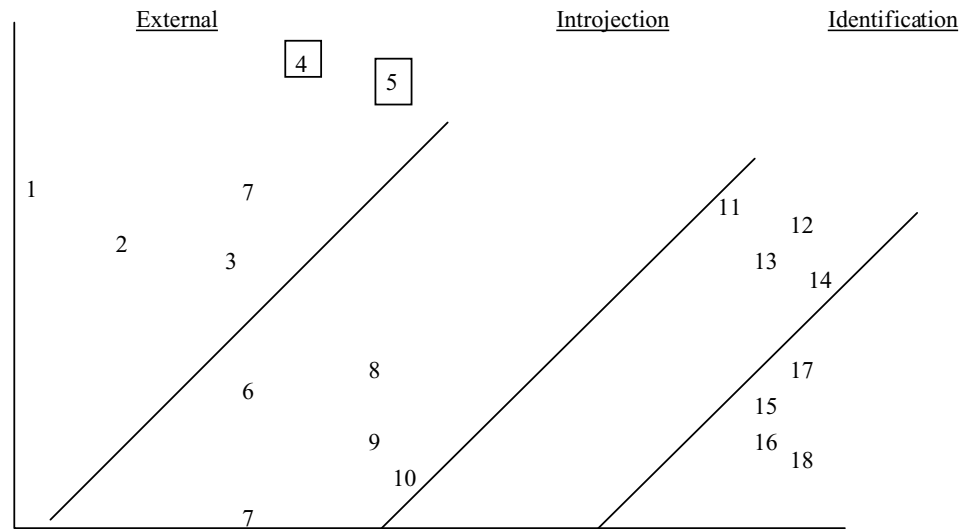
Study 3: PLOC regarding effort investment in specific domains of interest among elementary school students

Method

The sample consisted of 417 Israeli elementary school students from three schools (204 boys and 213 girls) in 4th, 5th and 6th grades. The mean age was 10.7 ($SD = 1.15$) for boys and 10.7 ($SD = 1.47$) for girls. According to the classification of the Israeli Ministry of Education, these schools serve populations that are mostly middle class or lower middle class. The school staff and the authors cooperated in an educational program aimed at supporting students' intrinsic motivation. Part of the educational program included group activities in special domains of students' interests. At the beginning of the school year, students were asked to list subjects of interest in which they would like to participate as part of their school activities. The school staff chose from the list several subjects that fit the teachers' qualifications and interests. As a result, the teachers set up a list of subjects (e.g., sports, handicrafts, specific subjects in science, etc.) that became part of the school schedule. The students chose a subject from the list, according to their preference. The school staff made an extra effort to ensure that the choices made by students were based on their personal interests rather than

other reasons (like peer pressure). In order to do so, the process was accompanied by personal dialogue between student and teacher.

After several months of participating in the domains-of-interests activities, the students completed questionnaires assessing their Perceived Locus of Causality regarding their effort investment in the activity they chose. The questionnaire also assessed several other variables unrelated to this research. Research assistants with special approval to work with children administered the students' questionnaire when teachers were not present in the classroom. Students indicated their responses to the various items using a 5-point scale extending from very true to not true at all. Similar to the first two studies the research was approved by the IRB of Ben-Gurion University and by the Educational Ministry.

Instruments

Examination of PLOC was based on students' self-reported reasons for the engagement in the self-chosen domain-of-interest activity. As noted earlier, four PLOC categories were examined: external, introjection, identified, and intrinsic. The reasons for engaging in the activity are similar to the reasons that were used in the first two studies. The complete scales are presented in the Appendix.

Twenty-eight items were administered, seven items for each category. Using initial SSA, eight items were discarded because of their inadequacy in relation to the relative autonomy continuum. The final scales included five items for each of the four reason categories. As had been done in the first two studies, two out of five items of the external locus of causality measured conformity with rules and norms.

The same scale used in the previous studies for measuring positive emotions in the classroom was used here.

Table 2 Simplex-like pattern of correlations among the four PLOC categories for doing class work (elementary school students)

	External	Introjection	Identification	Intrinsic
External	–			
Introjection	.50**	–		
Identification	.27**	.29**	–	
Integration	.10	.27**	.53**	–

*p < .05; **p < .01.

Fig. 3 SSA of elementary school students' PLOC regarding engagement in self-chosen domain of interest. *Notes.* *Each number in the diagram represents an item (items are presented in the Appendix). *The conformity items are in frames
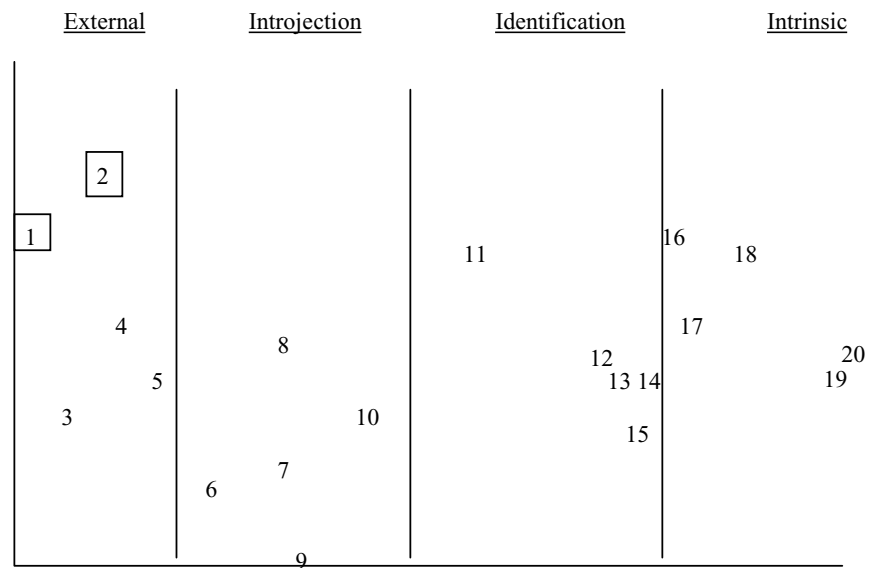
Results and conclusions

Figure 3 presents the final items map produced by two-dimensional SSA using a HUDAP program (Shye, 1991). Inspection of the Figure indicates that, in line with the findings of the first two studies, students differentiated among the four PLOC categories. This conclusion is supported by a satisfactory alienation coefficient of 0.13. Furthermore, each set of theoretically distinct items fell at its expected location along a horizontal continuum that appears to represent the relative autonomy continuum proposed by Ryan and Connell (1989).

Interestingly, in opposition to the results of the first two studies, the location of the two conformity items in the SSA map (items 1 and 2 that are presented in frames) does not support the hypothesis regarding an intermediate level of conformity in between external PLOC and introjected PLOC. Although the conformity items found to be somewhat separated from the other three items that measure direct external contingencies, the deployment of the items revealed that the conformity items do not fall between the external contingencies and introjection. Moreover, in this sample (unlike the previous samples), the items' deployment revealed that, to some extent, the three items concerned with external rewards and punishments are closer to the introjection items than the conformity items.

The reason for this finding might be attributed to the specific content of the third study. Unlike the first two studies in which the participants had to report on their PLOC regarding the effort they invested in regular classes, the participants in the current study were asked to report on their PLOC regarding the effort they invested in a specific class devoted to a self-chosen domain of interest. Thus, it seems unlikely that

the children would perceive the locus for their motivation in a self chosen-domain of interest as being caused by compliance with school's general norms and rules ("I participate in interest-domain classes because this is what I am required to do," or "because that is the rule"). Still, that does not explain why, in contrast to the first two studies, the students' experience of conformity in this sample seems to be more external than actual external restrictions and contingencies.

A possible explanation for these results might be the inconsistency of the stems that were used for the different items. For external and introjected regulations we used stems that refer to the effort or quality of student's work in the interest-domain class (e.g., "I invest in interest-domain class because ..." or "I try to work well in interest-domain class because ...") whereas for conformity the stem deals only with participation ("I participate in interest domain class because ..."). Thus, the different order of the three categories (external, conformity, and introjection) as compared with the other two studies might be due to the similarities of the stems that were used for external and introjected regulations and the differences between those stems and the stem that was used for conformity.

Internal consistency of the scores in this sample was measured by Cronbach alpha coefficients. The values were .75, .79, .77 and .80 for external, introjected, identified, and intrinsic respectively. Table 3 presents a perfect simplex pattern of correlations among the four categories.

Finally, the correlations between the four PLOC categories and positive emotions in the classroom confirm our hypothesis (for external: $r = -.19, p < 01$; for introjected, $r = .11, p < .05$; for identified: $r = .48, p < .01$; and for intrinsic: $r = .55, p < .01$).

Table 3 Simplex-like pattern of correlations among the four PLOC categories for engaging in domain of interest class (elementary school students)

	External	Introjection	Identification	Intrinsic
External	–			
Introjection	.43**	–		
Identification	.05	.43**	–	
Integration	−.02	.27**	.57**	–

$^*p < .05$; $^{**}p < .01$.

General discussion

The results of the three studies support the relative autonomy continuum posited by SDT (Deci & Ryan, 1985; Ryan & Deci, 2000) and are consistent with the extensive empirical research driven by the RAI concept (Assor et al., 2005; d'Ailly, 2003; Koestner et al., 1996; Ryan & Connell, 1989; Vallerand, Fortier, & Guay, 1997; Vansteenkiste, Zhou, Lens, & Soenens, 2005).

Given the extensive use of this measure in motivational research and the special interest in developing the measure across divergent cultures and domains, the goal of the present research was to demonstrate the utility of SSA for the exploration of the construct of relative autonomy continuum. The results demonstrate two main advantages of this method. One advantage is mainly technical. The construction of the RAI measure requires identification of items that best fit the various motivations and thus fall in specific locations along the relative autonomy continuum. In addition, it is important to identify deviant items that do not fall on the expected location along the relative autonomy continuum. SSA provides an easy and efficient method for detecting "good" and "bad" items (i.e., items that fall in their expected locations and those that do not).

The second advantage involves theoretical refinement and development, as the items' spatial deployment might reveal patterns in the data that may be overlooked while using correlation tables.

In the present research, two out of three studies support the assumption that conformity exists as an intermediate level between external regulation and introjection. This finding, which might be overlooked while using correlation tables, may be important for the refinement of the theory. On the one hand, conformity does not necessarily convey direct control by external authority and, on the other hand, it might involve contingent self-esteem (a form of introjection). This overlap in features is most likely to be represented in an SSA map as a sub-category between external and introjected regulation.

Again, the purpose of the present research was not to refine the concept of relative autonomy in SDT, but rather to demonstrate the methodological advantages of using SSA

to construct relative autonomy indexes in the future. Before suggesting a new weighting system that incorporates the conformity distinction described above, more research needs to be done using expanded scales to assess external, conformity and introjected regulation. Such research should also include measures of well-being and of performance to assess the validity of this distinction.

In addition to its implications for SDT's general concept of internalization, this new distinction might also be important in specific behavioral domains and among cultures, particularly regarding the universality of the psychological need for autonomy postulated by SDT. Various cross-cultural researchers have argued that the experience of autonomy, which has been found to be an important predictor of well-being in Western cultures, is not valued as strongly by members of Eastern societies (Heine, 2003; Markus & Kitayama, 2003; Oishi, 2000). They have argued that the experience of autonomy is less compatible with Eastern cultures that embrace collectivistic (as opposed to individualistic) values (Triandis, 1995). Thus, based on the perspective of matching between personal values and values that are emphasized by the culture [Sagiv & Schwartz, 2000], it might be claimed that although strong forms of external coercion can be harmful to members of both Eastern and Western cultures, conformity with rules and collective values might be adaptive in Eastern societies in which those values are emphasized.

A recent study by Kaplan et al. (2005) that examined this question among Israeli Bedouin, who are characterized by a strong hierarchical-collectivistic orientation (Al Haj, 1987; Al Karnawi, 1999; Katz & Assor, 2002), found no support for this claim. Kaplan et al. (2005) found that conformity among Bedouin children in elementary school was correlated negatively with academic achievement and positively with negative affect at school. Although this is well beyond the scope of the present research, it seems important to examine the relations between conformity, well-being, and performance in collectivistic societies.[4]

Furthermore, the SSA method can be used for an elaborated exploration of the relative autonomy continuum in various new directions that might be of interest for researchers in the field of motivation. For example, SSA can be used to explore subcategories of approach and avoidance motivation (Elliot, 1999; Elliot & Church, 1997) that may be present in motivational states that differ with respect to their PLOC.

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[4] According to our perspective, the debate regarding the universality of the need for autonomy as postulated by SDT is based at least in part on different definitions that were given to the need for autonomy. SDT differentiate the construct of autonomy from those of individualism, independence, or separateness while other scholars treat them as synonymous. These definitions and distinctions are beyond the scope of the current research. For comprehensive discussion of this issue, see Chirkov, Ryan, Kim, and Kaplan (2003).

For instance, a behavior that is regulated by an attempt to avoid punishment can be defined as an external avoidant motivation, while behavior that is regulated by an attempt to obtain a reward can be defined as an external approach motivation. The same distinction can be made for introjected and identified regulations.

Two main predictions can be made in relation to the approach-avoidance distinction. First, based on researchers who argue for positive outcomes of approach (versus avoidance) motivation (Church, Elliot, & Gable, 2001; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002), it is possible to claim that along the relative autonomy continuum the avoidance motive in each PLOC category will be more external than the approach motive. A second prediction may treat the two phenomena as two separate dimensions. Thus, it can be predicted that given the coercive nature of both external approach (doing a task for a reward) and external avoidance (doing a task in order to avoid punishment), these two types of external regulations would not differ on the dimension reflecting the relative autonomy continuum, but they would differ on a second dimension of approach-avoidance motivation. A third option might combine both predictions. While two-dimensional SSA may distinguish between the two dimensions of relative autonomy and approach-avoidance motivation, the items of each category on the relative autonomy dimension might also show differences between approach and avoidance motivation as was described in the first prediction.

In sum, this research suggests that using correlations tables for the construction of the RAI, as has been done so far in the literature, might be cumbersome and might fail to detect patterns in the data that are valuable in specific domains or specific cultures. SSA might overcome these limitations by providing a map of item deployment in a multi-dimensional space. As for the findings regarding conformity as an intermediate level between external motivation and introjection, future research should replicate these findings on a larger scale and by using measures of well-being, and performance for validation and theoretical purposes.

Appendix The PLOC items

Study 1

External

1. I do my homework because I'll get in trouble if I don't.
2. I do my homework so that the teacher won't yell at me.
3. I try to do well at school because I don't want to have problems.
4. I do my class work because that's the rule.
5. I do my homework because this is what I am required to do.

Introjection

6. I try to do well at school because I will feel bad about myself if I don't.
7. I do my class work because I'll feel ashamed of myself if I don't.
8. If I don't try to answer the difficult questions in class, I will feel ashamed of myself.
9. I do my homework because I will feel bad about myself if I don't.
10. I try to do well at school because I feel guilty when I don't do all that I can.

Identification

11. I invest in my class work because studies are important to me.
12. I invest in my studies because it will help me in the future.
13. I try to answer the difficult questions in class, to find out if I am right or wrong.
14. I participate in class discussions because I know I will learn from them.
15. There are subjects I invest in because they will help me understand things that are important to me.

Intrinsic

16. I read books related to my studies because it interests me.
17. I do my homework because I enjoy it.
18. I do my class work because it is fun.
19. I do my class work because I enjoy it.
20. Learning in class is interesting for me.
21. I try to answer difficult questions in class because it interests me.

Study 2

External

1. I do my homework so that the teacher won't yell at me.
2. I do my homework because I'll get in trouble if I don't.
3. I try to do well at school because I don't want to have problems.
4. I do my homework because this is what I am required to do.
5. I do my class work because that's the rule.

Introjection

6. I do my class work because I'll feel ashamed of myself if I don't.
7. If I don't try to answer difficult questions in class, I'll feel ashamed of myself.
8. I do my homework because I'll feel bad about myself if I don't.
9. I try to do well at school because I will feel bad about myself if I don't.
10. I try to do well at school because I feel guilty when I don't do all that I can.

Identification

11. I try to answer the difficult questions in class, to find out if I am right or wrong.
12. I invest in studies because this will help me in the future.
13. There are subjects I invest in because they help me understand things that are important to me.
14. I participate in class discussion because I know I will learn from it.
15. I do my class work because it is fun.
16. I do my homework because it is interesting.
17. I do my class work because I enjoy it.
18. I do my homework because I enjoy it.

Study 3

External

1. I participate in interest domain classes because this is what I am required to do.
2. I participate in interest domain classes because that is the rule.
3. I make an effort in interest domain classes so that the teacher won't yell at me.
4. I invest in interest domain classes because I'll get in trouble if I don't.
5. I try to work well in interest domain classes because I don't want to have problems.

Introjection

6. I pay attention in interest domain classes because I will feel bad about myself if I don't.
7. I do my class work because I'll feel ashamed of myself if I don't.
8. I try to do well in interest domain classes because I want other students to appreciate me.
9. I try to do well in interest domain classes because I feel guilty when I don't do all that I can.
10. I try to work well in interest domain classes because I'll feel bad about myself if I don't.

Identification

11. I try to answer the difficult questions in my interest domain classes, to find out if I am right or wrong.
12. I work seriously in interest domain classes because I want to learn new things.
13. I pay attention in interest domain classes because I want to understand the subject.
14. I invest in work in interest domain classes because the subject interests me.
15. I invest in my interest domain classes because it will help me in the future.

Intrinsic

16. I try to answer the difficult questions in interest domain classes because I enjoy it.
17. I try to answer difficult questions in interest domain classes because it interests me.
18. At home, I do assignments for the interest domain classes because it is interesting.
19. I do my assignments in the interest domain classes because I enjoy it.
20. I do my assignments in the interest domain classes because it is fun.
20.

Note: The numbers of the items correspond to the numbers in the figure of each study.

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