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Fear or greed? Duty or solidarity?
Motivations and the development of sociocognitive and moral reasoning: experimental evidences from public-goods provision dilemmas

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Abstract

Judging from the perspective of standard game theory, empirical research has uncovered a rich array of "anomalies" that systematically occur in situations that were once thought to have properties leading to clear predictions. This is particularly the case for social dilemmas related to the appropriation of common-pool resources and provision of public-goods. Explanation of such anomalies has focused on the effects of structural variables and contexts on people's decisions. However, the present study suggest that classifications or typologies based on such descriptors of the action situation are not enough to explain and predict individuals' decisions in social dilemmas because sociocognitive and moral reasoning has its own stages of development and cannot be deduced from the objective incentive structure or context of action alone. In order to examine this proposition we test experimentally the explanatory power of a selected developmental model designed to rationally reconstruct the pretheoretical knowledge of competently judging subjects. Results indicate that the theoretical constructs of the chosen model provide reliable source of information to explain and predict diverse behavioral responses to similar incentive structures in a public-goods provision dilemmas under variable institutional conditions.

Keywords: public-goods; experimental economics; psychosocial development

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1. Introduction

As the increasing urbanization and growing demand for agricultural commodities impart major changes on the landscape of global agricultural systems, the rising pressure upon the open-access, common-pool resources and ecological environments of the globe reinforces the importance of understanding better the factors underlying the provision (or lack thereof) of public-goods, such as cooperative rules and other institutional arrangements organized locally.

On the other hand, this theme definitely calls for an extension to the agricultural economics toolkit towards the principles, techniques and approaches from other disciplines, because the standard economic theory relies on rather specific assumptions about the agents' cognitive capacities, valuations, and intentional states that are relatively unproblematic in a market setting, but have potentially seriously misleading implications when applied outside this sphere (Gintis, 2000).

Relating to provision dilemmas, the essence of the puzzle comes from the particular payoff structure resulting from both the public nature of the good and the way in which two or more persons are interdependent for obtaining outcomes. The problem is that if many or all individuals in this interdependence structure try to maximize their own outcomes the effect is that (sooner or later) everybody gets less than if they had not done so (Dawes, 1980; Messick & Brewer, 1983).

As Poppe (2005) explains, the payoff structure of the dilemma is formed otherwise by the characteristics of the outcomes (high or low, certain or probable, et cetera), and the characteristics of the group of people involved in the dilemma situation (large or small group, with or without communication, with or without a leader, et

cetera). In addition to the effects of these structural variables on people's decisions (cf. e.g. Kopelman, Weber, & Messick, 2002; Kollock, 1998; Komorita & Parks, 1995; Lepyard, 1995; Van Lange, Liebrand, Messick, & Wilke, 1992), Poppe argues that real-life social dilemmas (and also social dilemmas in a laboratory) are affected also by the specific *content* or context of the decisions. As puts it, "to understand and predict people's choices in social dilemma situations it is needed to know not only the structural characteristics of the dilemma and their effects, but also the content or the context of the dilemma and the way the content of context affects the decisions" (p. 433). Popper then attempts to move towards a classification system based on content, context and structure that may provide more insight into relevant distinctions.

In this study we argue that the usefulness of such classifications depends also on knowledge about how heterogeneous individual reach *diverse utility judgments* about action and outcomes—particularly outcomes obtained by others. This is particularly so when addressing social dilemmas because these situations, even if relatively simple from the structural point of view, frequently evoke positive or negative *internal values* for participants that are *not* monotonically related to the objective payoffs involved (Ostrom, 2005).

This research explores the constructivist developmental point of view for making sense of participants' diverse responses to similar and variable incentive structures in a laboratory provision dilemma. We begin by assessing participants' emergent stages of interior growth as described by a selected developmental model (Graves, 1970) designed to rationally reconstruct the pretheoretical knowledge of competently judging subjects. The explanatory power attributable to the psychosocial profiles of the participant is tested in experiment by examining the statistical correlations between participants' profiles and their decision and motivations.

2. Cooperate or free ride? The *biopsychosocial* waves of agency and communion

Rather than purely a psychological study, the developmental theory we examine here (Graves, 1970 and 2005) postulates that the *biopsychosocial* development of human beings arises from the interaction of a double-helix complex of two sets of determining forces: the environmental social determinants, and the neuropsychological equipment of the organism for living. Out of about a decade of careful empirical research, Graves conceptualized eight emergent stages or waves of interior growth which provide a description of states of biopsychosocial equilibrium, comprising a perception of the environment, a reciprocal state of neurochemical balance, reflected in a social construction that then influences those mental states of equilibrium, as part of the environment perceived.

Though each behavioral system associated to those stages must be viewed with a different premise, out of their own specific aims and means, Graves's theory puts forward that people tend to oscillate back and forth between two fundamental stances, much like the relative position of a pendulum in its arc between "me" (agency) and "we" (communion) orientations (Cowan & Todorovic, 2005). Along with this cyclical turn, human development is described as "an unfolding, ever-emergent process marked by subordination of older behavior systems to newer, higher order systems" (Graves, 2005. p. 29), so that new capacities and broader perspectives are added to the previous ones. As a result, the developmental process brings forth marked qualitative changes showing *decreasing* egocentrism and *increasing* behavioral freedom.

Due to space restrictions, we limit the characterization of Graves's theoretical constructs to their corresponding styles of thinking and main themes, as presented in Table 1. The feature showing decreasing egocentrism is noticeable by comparing the themes corresponding to the 3rd, 5th, and 7th stages. The whole scheme implies a

widening of the moral embrace, i.e., of those who are considered worth of moral concern.

Clearly, we suggest that these patterns have important implications for the institutional analysis of social dilemmas. Actually, a central tenet in developmental psychology is that, in order to produce the expected results, the incentive structure should be tuned to the characteristics of each psychosocial centralization stage due to unique motivational needs that differ within each stage. Besides, the qualitative changes also suggest that coercive institutions might well be substituted for further interior transformation.

Table 1. Cyclical aspect, way of thinking and themes of the selected Gravesian stages or waves of interior development

Stage/wave	Cyclical aspect	Thinking	Theme
7th	Express-self (agency)	Ecological	*'Express self for what self desires, but never at the expenses of others and in a manner that all life, not just my life, will profit'*
6th	Sacrifice-self (communion)	Sociocentric	*'Sacrifice now in order for all to get now'*
5th	Express-self (agency)	Strategic	*'Express self for what self desires, but in a fashion calculated not to bring down the wrath of others*'
4th	Sacrifice-self (communion)	Absolutistic	*'Sacrifice self now to receive reward later'*
3rd	Express-self (agency)	Egocentric	*'Express self, to hell with others and the consequences, lest one suffer the torment of unbearable shame'*
2nd	Sacrifice-self (communion)	Animistic	*'Sacrifice self to the way of your elders'*

Source: Author's configuration based on Graves (2005)

3. Method and procedures

The participants in the public-goods experiment were, for the most part, Brazilian undergraduate students from the most diverse major degrees. Prior to take part in the experiment, 322 potential participants (44% females and 56% males) filled out an authorized Portuguese translation of the Spiral Dynamics Discovery Survey. The assessment tool consists of forty multiple choice questions in the Most Like Me/Least

Like Me format. It was designed by Hurlbut (1979) to reveal a person's psychosocial profile (from 2nd to 7th stage) with reference to his/her overall lifestyle and not any compartmentalized area of life such as his/her professional occupation, family life, religious beliefs, etc..

In order to verify the cross-cultural robustness of Graves's general scheme, we carried out a *factor analysis* on the survey data. Following the experiment, we conducted a series of statistical analysis (Pearson correlations and multivariate regressions) using both the original survey data and the principal components obtained via factor analysis in order to test the explanatory power of Graves's constructs (Table 1) in relation to participants' behavior and motivations in the experimental conditions.

3.1. Experiment summary

The experiment was a step-level give-some dilemma based on Poppe and Zwikker (1996). Enough participants had to contribute in order to obtain outcomes for all. During the experimental sections, discussion between the participants was not allowed. From a total of 172 people who answered our call, a total of 127 subjects (62 female and 65 male) actually showed up and took part in the experiment.[1]

The experiment consisted of nine trials. In each of the trials every participant had 0.50 reais (about US$ 0.25) at his or her disposal. The participants were asked to decide whether they would keep the 50 cents or would contribute them to a common pool. (''I do/do not contribute''). If at least X percent of the participants contributed the 50 cents to the pool, all participants—those who had not contributed included—would receive R$ 1.00. If a participant contributed him- or herself and not enough others contributed, s/he would lose his or her contribution. Thus, in each trial the participant could get R$ 0.00 (s/he contributed but not enough others contributed); R$ 0.50 (s/he

[1] There is a missing case regarding the Spiral Dynamics profile, so that we have a total of 126 cases included in the statistical tests below.

did not contribute and not enough others contributed); R$ 1.00 (s/he contributed and enough others contributed) or R$ 1.50 (s/he did not contribute but enough others contributed).

The percentage (X) of the total participants who had to contribute in order to receive the 50 cents from the pool varied. Along the sequence of the nine trials the percentages were 40%, 70%, 10%, 60%, 90%, 30%, 50%, 80% and 20% respectively. In order to reveal the motivation under participants' decisions, before every trial the participant was asked to indicate which percentage of all participants s/he expected to contribute (''I expect that ____ percent of all participants contribute''). To stimulate the participants to mention accurate expectations, we settled that each of the 9 participants (one per trial) with the most accurate expectations would receive a bonus of R$ 5.00. Thus, in every trial it was established whether the participant did expect that enough others would contribute or did not expect that enough others would contribute and whether the participant did contribute or did not contribute him- or herself.

The alternative motives underlying participants' decisions whether or not to contribute were determined by comparing participants' revealed expectations with their actual decisions in each trial. If the participant did not contribute, the motive could be either *greed* or *fear* (of losing her contribution) depending on whether the participant expected that there would be enough contributions for the provision of the public good. Similarly, if the participant did contribute, the motive could be either *solidarity* (if she expected that there would be enough contributions) or sense of *duty* (if she contributed even when disbelieving that there would be enough contributions (Figure 1). For each motive a dichotomous score reflected the presence or absence of that motive in a trial.

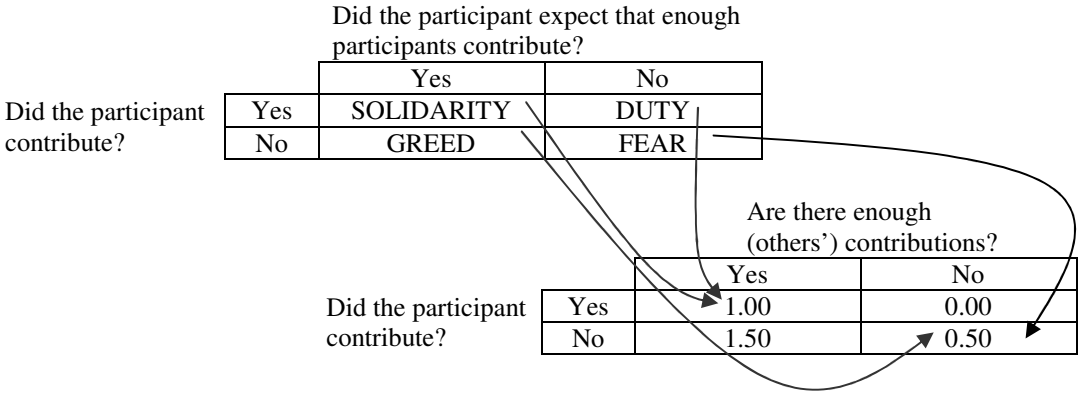

Figure 1. Public good experiment: motives and final outcomes.

3.2. Theoretical expectations

Regardless the level of required contribution, insofar as the incentive structure creates the provision dilemma (Figure 1) the standard game-theoretic prediction suggests that the public good will not be supplied (the dominant strategy is not to contribute). The theory makes no distinction between the alternative motives and tacitly identifies the decision of not contributing with the rational choice itself. That not only the levels of required contribution but also the context and actual content of the decision affect participants' behavior in public-goods experiments have been shown elsewhere (e.g. Poppe, 2005; Kopelman et al, 2002; Kollock, 1998; Komorita & Parks, 1995; Lepyard, 1995; Van Lange et al, 1992). Here we want to know how participants' decisions and motivations relate with the stages of psychosocial development, as described in Graves's model (Table 1), so as to evaluate the implications of the human potential for moving up that stages of interior growth on the provision of public goods.

We skip the theoretical discussion about how individuals centralized at different stages of psychosocial development are supposed to form expectations regarding the

behavior of others.[2] About the frequency of contributions on the average of the nine trials we posit that:

H1_contributions: both the 3rd and 5th stages of psychosocial development (Table 1) are expected to contribute less frequently, while the sacrifice-self systems (2nd, 4th, and 6th stages) plus the 7th stage are expected to contribute more frequently.

As for the motivations underlying the alternative decisions, we posit that under the decisions to cooperate we should find that:

H2.1_motivations to contribute: the 2nd, 4th, and 6th stages cooperate out of both *solidarity* and sense of *duty*. The 5th and 7th stages cooperate out of *solidarity* but *not* sense of *duty*; while the 3rd stage is expected not to cooperate.

As to the decision of not contributing, we posit that:

H2.2_motivations to not to contribute: when individuals centralized at the 2nd, the 4th, the 6th or the 7th stages decide not to cooperate, the underlining motive should be *fear* but *not greed*. The motives underlying the refusal to cooperate on the part of individuals centralized at either the 3nd or 5th stages of psychosocial development can be are both *fear* and *greed*.

4. Results

4.1. Factor analysis suggests the Graves's scheme in cross-culturally robust

Differently from what terms like "stages" or "levels" might lead to believe, psychosocial development is, overall, as complex wave-like phenomenon, which much overlap and interwavering, resulting in a meshwork or dynamic spiral of consciousness unfolding (Beck & Cowan, 1996; Wilber, 2001). As such, the separate stages or levels of development are just theoretical constructs that impart *nodal* positions or "centers of

[2] This issue involves the combination of the psychosocial characteristic of each stage and the way as the individuals centralized at different stages see others as been mostly alike or unlike to him- or herself.

psychosocial gravity;" not the *total* systemic manifestations of concrete individuals. Notwithstanding, these nodal positions are posited to follow a same stepwise, invariant sequence, so that that interwavering of systems does not occur at random, but must, instead, put across certain logic of mutual evaluative perspectives (see Table 1).

Accordingly, the component matrix resulting from the factor analysis must convey a nonarbitrary pattern of correlations between the variables in the survey data in order to generate theoretically meaningful components. In the present case, the analysis of component matrix (Table 2) points toward three plainly meaningful principal components expressing nodal positions at (i) the *egocentric*, 3rd wave (Factor 1), (ii) *absolutistic*, 4th wave (Factor 2), and (iii) *sociocentric*, 6th wave (Factor 3).

Table 2
Factor Analysis: Rotated Component Matrix[a]

Variable	Rescaled communalities	Rescaled Component		
		1	2	3
2nd_most	.466	**.369**	**.476**	**.335**
2nd_least	.592	.002	**-.464**	**-.614**
3rd_most	.538	**.722**	.072	-.109
3rd_least	.851	**-.897**	.124	.176
4th_most	.733	**-.346**	**.783**	-.007
4th_least	.733	**.727**	**-.453**	.020
5th_most	.696	.092	-.052	**-.827**
5th_least	.532	-.069	-.246	**.683**
6th_most	.788	**-.423**	-.069	**.774**
6th_least	.518	**.569**	.256	**-.359**
7th_most	.766	.109	**-.850**	-.176
7th_least	.521	.215	**.682**	.104

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
The correlations detached in bold are all statistically significant
a. Rotation converged in 7 interactions.
Source: Research results

Taken together, the three factors explain about 70% of the total variance in the sample (Factor 1 = 23.44%; Factor 2 = 22.15%; and Factor 3 = 24.56%, after Varimax

rotation[3]). We claim that the theoretical meaningfulness of principal components configure an indication of the cross-cultural robustness of Graves's constructs, since we assessed his construct in a sample of Brazilian participants. The robustness of Graves's model is supported by associations between the factors scores and the behavioral observations produced in the laboratory CPR appropriation dilemma.

4.2. Different conditions, different decisions and motives: institutions clearly matter

Table 3 presents the distribution of expectations, actual decisions and motives according the three grouped levels of necessary contribution. The results show that, considering all trails, 51.4% of the participants expected that enough (other) participants would contribute. The actual percentage of contributors amounted to only 26.0%. Given this, the public good was provided only up to the 40% contribution level. In the nine trials, 28.6% of the participants showed *greed*, 45.1% *fear*, 22.8% *solidarity* and 3.4% a sense of *duty*.

Following Poppe (2005), we performed a series of ANOVA with contribution level as within-subject factor. If an ANOVA showed a significant effect of contribution level, it was followed by a linear trend analysis. It was found that the contribution level had significant effect both on expectations and decisions whether to contribute or not, as well as on the motives under the participants' decisions. The results in Table 4 show that the higher the percentage of participants that had to contribute in order the public good could be provided the less participants expected enough participants to contribute and the less they contributed themselves. Therefore, the more contributions were required the more *fear* and sense of *duty* and the less *greed* and *solidarity* the participants showed. We now want to know whether the stage of psychosocial development have something to do with participates' decisions and motivations.

[3] It should be mentioned that when the Varimax rotation is done the *maximum variance property* of the original components is destroyed. The rotation essentially reallocates the factor loadings and, thus, the first rotated factor will no longer *necessarily* account for the maximum amount of variance.

Table 3
Percentages of participants who did (not) expect enough others to contribute, did (not) contribute themselves and showed fear, greed, solidarity and a sense of duty

	Participant expected that enough participants contributed					
	No		Yes		Both	
		Fear		***Greed***		
Participant did not contribute	Low	12,6	Low	57,0	Low	69,6
	Medium	40,9	Medium	23,4	Médium	64,3
	High	81,9	High	5,5	High	87,4
	All	45,1	All	28,6	All	73,8
		Duty		***Solidarity***		
Participant contributed	Low	1,0	Low	29,4	Low	30,4
	Medium	3,4	Medium	32,3	Médium	35,7
	High	5,8	High	6,8	High	12,6
	All	3,4	All	22,8	All	26,2
Both	Low	13,6	Low	86,4		
	Medium	44,4	Medium	55,6		
	High	87,7	High	12,3		
	All	48,6	All	51,4		

Note: Low, Medium, High: trials in which a low (10–30), medium (40–60) or high (70–90) percentage of the participants had to contribute to obtain R$1.00. All: all trials.
Source: Research results.

Table 4
Linear trend: independent variable is contribution level (10-90)

Dependent variable	Model summary		df1	df2	Parameter estimates			Sig.
	R Square	F			Constant	B	Std. Beta	
Expectation	0,390	729,149	1	1141	1,119	-0,012	-0,624	0,000
Contribution	0,027	31,553	1	1141	0,402	-0,003	-0,164	0,000
Fear	0,343	595,425	1	1141	-0,113	0,011	0,586	0,000
Greed	0,235	351,131	1	1141	0,711	-0,008	-0,485	0,000
Duty	0,013	14,985	1	1141	-0,006	0,001	0,114	0,000
Solidarity	0,049	58,688	1	1141	0,408	-0,004	-0,221	0,000

Source: Research results.

4.3. Same conditions, different decisions and motives: interior growth matters as well

Beginning with the decisions whether or not to contribute for the common-pool, results from multivariate regression analysis using the three principal components as predictors (Table 5) suggest that the provision of the public good is supported mainly by the individuals scoring higher in the *sociocentric* stage or wave of psychosocial development (Factor 3). This result concurs with the expectations respecting the 6th stage, and it is also in agreement with the expectations related to the 2nd and 5th stages (**H1_contributions**), due to the internal relationships between the themes associated to these stages of psychosocial development in the Factor 3 (cf. Table 2).

Table 5
Linear multivariate regression dependent variable: participant contributed for the common pool (total of the nine trails)

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	,263	,020		13,225	,000
	Egocentric	-,029	,022	-,119	-1,349	,180
	Absolutistic	,008	,021	,033	,378	,706
	Sociocentric	,048	,020	,213	2,405	,018

As for the motivations underlying the decisions ensuing from individuals centralized at different stages of psychosocial development, the results shown in the Tables 6 and 7 are likewise in wide agreement with the theoretical expectations. There one sees that the motive *greed* (for not contributing) correlates positively with the acceptance of the themes associated to both the 3rd and the 5th stages (and negatively with the rejection of those themes), as suggested in **H2.2**. These relationships appear also as *negative* correlation between the motive greed and individuals' scores in the Factor 3 (sociocentrism). Still regarding the motives for not to contribute, the significant

negative correlation involving the motive *fear* and the acceptance of the 6th level's theme in noteworthy and logical, even if not expected.

Relating to the decisions to contribute, *solidarity* and *duty* correlates positively with the acceptance of the theme of the 6th stage (as in **H2.1**), and thus with higher scores in the Factor 3. In contrast, the motive *duty* correlates negatively with the acceptance of the theme of the 5th level (and positively with its rejection), while the motive *solidarity* correlates negatively with the scores in egocentrism (Factor 1). The positive correlation between the motive *duty* and the *rejection* of the 3rd level's theme confirms this expected (**H2.1**) relationship, whereas the negative correlation with the rejection of the 4th level's theme concurs with the hypothesis **H2.1** as well.

Table 6
Pearson bivariate correlations: motives and payoff (n = 126)

Survey variables and Factors	Motive of decision				Total payoff
	"Fear"	"Greed"	"Duty"	"Solidarity"	
2nd_most	-0.009	-0.058	**0.125***	0.012	-0.047
2nd_least	-0.079	**0.209*****	-0.051	-0.078	0.073
3rd_most	-0.065	**0.139***	0.063	-0.078	0.023
3rd_least	0.002	**-0.142***	-0.027	**0.139***	**-0.119***
4th_most	0.094	-0.111	-0.015	-0.001	-0.011
4th_least	0.065	0.103	-0.062	**-0.144***	**0.169****
5th_most	0.011	**0.176****	**-0.171****	-0.102	**0.163****
5th_least	-0.030	**-0.197****	**0.218*****	**0.124***	**-0.192****
6th_most	**-0.151****	-0.105	**0.169****	**0.202****	**-0.230*****
6th_least	-0.041	0.087	-0.023	-0.022	0.035
7th_most	0.112	0.006	-0.097	-0.095	**0.122***
7th_least	0.111	-0.053	-0.042	-0.063	0.076
Egocentric	0.027	0.094	0.034	**-0.132***	0.114
Absolutistic	0.030	-0.060	0.023	0.010	-0.025
Sociocentric	-0.062	**-0.173****	**0.205****	**0.145***	**-0.194****

*** Correlation is significant at the 0.01 level (1-tailed).
** Correlation is significant at the 0.05 level (1-tailed).
* Correlation is significant at the 0.10 level (1-tailed).
Source: Research results

No statistically significant coefficients were found in multiple regressions or multinomial logistic models where the three principal components figured as predictors of the motives. Yet, by using the frequencies motives as predictors of the factor scores we were able to confirm the relationship between the motives and the sociocentric stance (including the acceptance of the 6th and the rejection of the 5th levels' themes). These results are presented in Table 7, where each model excludes one motive due to the existence of multicollinearity. The Model 1 confirms that both motives under the decision to contribute for the provision of the public good are positively associated with the factor scores in sociocentrism, while Model 2 shows that both motives under the decision of not contributing are negatively associated with the factor scores in sociocentrism.

Table 7
Linear multivariate regression dependent variable: sociocentrism (all trials)

Motive		***Sociocentrism* (Factor 3)**	
		Model 1	Model 2
Solidarity	Std. Beta	**0,206**	-0,369
	sig.	0,065	0,130
Duty	Std. Beta	**0,243**	---
	sig.	0,014	---
Fear	Std. Beta	0,167	**-0,505**
	sig.	0,169	0,041
Greed	Std. Beta	---	**-0,529**
	sig.	---	0,014
(Constant)	Std. Beta	-0,648	2,298
	sig.	0,075	0,034
	F	**3,036**	**3,036**
	sig.	0,032	0,032
	R^2	0,069	0,069

Source: Research results

5. Conclusions and implications

In a sense, the fact the different individuals respond differently to similar incentive structures may seem rather unsurprising. The implications resulting from the developmental point of view requires, first, the recognition that individuals' utility judgments, particularly regarding actions and outcomes that affect the well-being of others, proceed from something deeper than the contingent features describing the action situation. This means, among other things, that the unfolding of different behavioral systems presents its own stages of growth and development, so that behavior cannot be inferred from the external context alone. In addition, researchers familiar with the findings in this field are reaching a growing consensus that interior development is a process involving, for the most part, a continuing decline in egocentrism, and increasing ability of taking other people, places, and things into account when making decisions. Insofar as this critical trait is present in Graves's model, our results proved some evidence also in this regards. Acknowledged, further research is needed in order to produce additional evidences of this feature. However, the implication of rather clear, as is suggests that the prime directive for institutional analysis and development involving social dilemmas should possibly be to promote the human movement up the levels of human existence.

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