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**IAAE Beijing Submission**

**The Development of the Willingness to Cooperate: Collective-Action under the  
Light of the Constructivist Conception of Adult Development**

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**Abstract**

Along with the changes experienced in the landscape of global agricultural and food systems there is a rising pressure upon the open-access, common-pool resources and ecological environments of the globe. While the conventional theory underlies the vision of a tragedy, and fosters Leviathan-like remedies to overcome problems of overexploitation and destruction of the commons, growing evidence from field studies has called for a serious rethinking of the theoretical foundations for the analysis of collective-action problems. Yet, in moving beyond the conventional view, the lack of a theory of human valuation hinders both the prediction of agents' variable responses to similar incentive structures and the development of a more general theory of collective-action. In this study, we test experimentally the explanatory power of a constructivist developmental model of adult personality systems which is particularly suitable for addressing situations where the individual and the collective gains conflict. The results suggest that the model provides a valuable source of information for the advancement of the theory of collective-action and has important implications for the development of intuitions aimed at overcoming social dilemmas.

*Keywords:* commons dilemma; experimental economics; psychosocial development

# **The Development of the Willingness to Cooperate: Collective-Action under the Light of the Constructivist Conception of Adult Development**

## **1. Introduction**

Along with the major changes experienced in the landscape of global agricultural and food systems owing to increasing urbanization and increasing demand for biofuels and other agricultural commodities there is a rising pressure upon the open-access, common-pool resources and ecological environments of the globe.

The prospective scenario respecting the global stocks of natural resources and biodiversity may be as dramatic as the one described by Garret Hardin (1968) in his influential *The Tragedy of the Commons*. As recognized, Hardin's illustration of the commons dilemma basically puts forward the standard economic theory of externalities, so that it relies upon a rather specific set of assumptions concerning both the action situation and the psychological makeup of the decision makers. Put roughly, the standard theory assumes that homogenous self-interested maximizers make perfectly informed decisions totally independently from each other, i.e., without any local leadership or shared norms. In these circumstances, canonical "rational egoists" (Ostrom, 2005) are supposed to pursue short-term, material benefits for themselves and ignore negative externalities in the form of both immediate consequences for others and long-term results for all.

The rational egoists are viewed as trapped by the "inherent logic of the commons" (Hardin, *ibid*, p. 1244) because even if the situation indicates that they could all be better off if they found a way of cooperating, no one acting alone is supposed to have an incentive to bear the costs of such cooperation. The point is that organizing so as to create and enforce the cooperating rules creates a *public good* for those involved, meaning that anyone who is included in the community of users benefits from those rules, whether or not they contribute for its creation and enforcement. Clearly, since

much of the initial problem is alleged to emerge because the agents are stuck by the “inherent logic of the commons,” the conjecture that those actors might solve the public-goods provision dilemma in order to address the original common-pool appropriation dilemma under analysis is theoretically inconsistent. As a result, the policy recommendations orienting the design of regulatory institutions on such setting typically suggest that the governance systems must be *imposed* upon the “helpless” users by external authorities.

However, as Ostrom (2007) points out, growing evidence from many studies of common-pool resources (CPRs) in the field has called for a serious rethinking of the theoretical foundations for the analysis of collective-action problems. She mentions a rich case-study literature which illustrates the wide diversity of settings in which users dependent upon CPRs have organized themselves to achieve much higher outcomes than is predicted by the conventional theory. As she explains, the point is that many social dilemmas come out in integrated social-ecological systems which are far more complex than represented in the base theory.

In particular, Ostrom (2005) suggests that while the canonical assumption of self-interest might be a reasonable one for modeling behavior in highly competitive market settings, it is not so for addressing most social dilemmas because this type of situation often evoke *internal values* that are *not* monotonically related to the objective payoff involved (see also Gintis, 2000; Camerer, 2003). Additionally, once the fact that intrinsic values matter for addressing collective-action problems is recognized, one is supposed to acknowledge as well that the situation is one of incomplete, rather than, complete information, because the agents cannot know exactly how the others are valuing the alternative actions and outcomes (*ibid*). Furthermore, the *kind* of uncertainty regarding others’ intrinsic values is not reducible to risk analyses, so that one should

accept also that observed behavior usually proceeds from discrete rules of thumb, rather than, maximizing calculations of expected utility.

In this context, Ostrom (2005) suggests that the major theoretical challenge facing scholars interested in social dilemmas today “is developing an appropriate family of assumptions to make about the intrinsic values individuals place on actions and outcomes—particularly outcomes obtained by others.” According to her, “Without further progress in developing our theories and models of human valuation in social dilemma situations, those convinced that all human behavior can be explained using rational egoist models will continue to recommend Leviathan-like remedies for overcoming all social dilemmas.”

In short, we suggest that the new driving forces in emerging economies shaping the global agricultural landscape in the 21<sup>st</sup> century underscores the significance of examining the phenomenon of social organization and local governance of global public goods, while this matter undoubtedly calls for an extension to the agricultural economics toolkit towards the principles, techniques and approaches from other disciplines—particularly for understanding how individuals reach *utility judgments* about actions and outcomes affecting the well-being of others.

In this paper, we present experimental results suggesting the suitability of a selected model of adult personality development for explaining the behavior of heterogeneous individuals embroiled in a CPR appropriation dilemma under variable institutional conditions. These are partial results from a broader research where the said model was tested in conjunction with a Public-Goods provision dilemma and the standard Ultimatum game. We begin by supplying a brief overview of the chosen model and of its theoretical constructs. In the sequence, we summarize the experimental designs, procedures, and theoretical expectations. The next section presents the main

results. We conclude the report with further comments on the theoretical and policy oriented implications of our experimental work.

## **2. Egocentrism and willingness to cooperate: a developmental perspective**

Rather than purely a psychological study, the developmental theory we examine here (Graves, 1981 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 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 pattern associated to those emergent 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). Further, 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 reducing egocentrism feature is noticeable by comparing the themes corresponding to the 3<sup>rd</sup>, 5<sup>th</sup>, and 7<sup>th</sup> stages. The whole scheme implies a widening of the moral embrace, i.e., of those who are considered worth of moral concern. While specific behavioral hypotheses must wait until we have presented the experimental conditions, it is clear from Table 1 that we should expect more cooperative dispositions in collective-action dilemmas from individuals centralized at some of the sacrifice-self systems (2<sup>nd</sup>, 4<sup>th</sup>, and 6<sup>th</sup>), or at the 7<sup>th</sup> express-self system; just as we should expect opportunistic behavior on the part of the individuals centralized at the 3<sup>rd</sup> and the 5<sup>th</sup> stages/waves.

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
7 <sup>th</sup>	Express-self (agency)	Ecological	<i>'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'</i>
6 <sup>th</sup>	Sacrifice-self (communion)	Sociocentric	<i>'Sacrifice now in order for all to get now'</i>
5 <sup>th</sup>	Express-self (agency)	Strategic	<i>'Express self for what self desires, but in a fashion calculated not to bring down the wrath of others'</i>
4 <sup>th</sup>	Sacrifice-self (communion)	Absolutistic	<i>'Sacrifice self now to receive reward later'</i>
3 <sup>rd</sup>	Express-self (agency)	Egocentric	<i>'Express self, to hell with others and the consequences, lest one suffer the torment of unbearable shame'</i>
2 <sup>nd</sup>	Sacrifice-self (communion)	Animistic	<i>'Sacrifice self to the way of your elders'</i>

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

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.

### 3. Method

Skipping detailed description about the experimental settings and participants, we mention only that the experiment was conducted in the classroom and that the participants (44% females and 56% males) were, for the most part, Brazilian undergraduate students from the most diverse major degrees.

Prior to take part in the experiment, 322 potential participants 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 2<sup>nd</sup> to 7<sup>th</sup> 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 the different experimental conditions.

#### 3.1. *Experiment summary and design*

A total of 200 participants (94 female and 106 male) took part in the CPR experiment (25 repetitions).<sup>1</sup> Following Ostrom *et al* (1994), the experiment consisted of thirty rounds in which the eight participants must decide how to allocate an endowment of fifteen tokens between two alternative investment opportunities. The alternative

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<sup>1</sup> Participants were selected according to their opportunity to take part in the experimental schedule.



opportunities were generically labeled as Market 1 and Market 2. Market 1 is a safe, outside activity in which each token yields a constant rate of output and each unit of output yields a return. Market 2 (the CPR) is a market that yields a rate of output per token dependent upon the total number of tokens invested by the entire group. The individuals' share of the total output produced in the Market 2 is equivalent to the percentage of total group tokens invested in that alternative.

The experimental design involved three different conditions, run in the following sequence: (1) ten rounds where decision were made without communication (open-access, baseline); (2) ten rounds following ten minutes of costless communication (communication), and (3) ten rounds with a costly sanctioning mechanism supplied (sanctioning) (Figure 2).

During the communication condition, participants' have the opportunity to devise a joint strategy that may raise the collective appropriation, but commitment with such strategy is strictly nonenforceable. A second nonobligatory communication opportunity between the 15<sup>th</sup> and the 16<sup>th</sup> rounds is the only reinforcing mechanism during the communication condition. The third condition introduces a costly sanctioning mechanism, so that the joint strategy may be reinforced if the participant decides to incur into a given fee in order to impose a corresponding fine on defectors. The value of both fees and fines are discounted from participants' final payment. Decisions whether

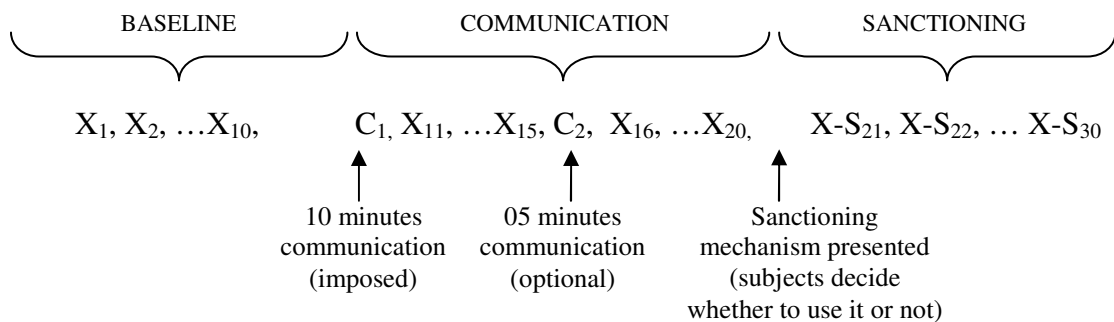


Figure 2. CPR experimental design

or not to fine defectors are taken immediately after the publication of the individuals' investment decisions in each round of the sanctioning conditions. Prior to subsequent rounds, all participants are *privately* informed respecting the fines eventually imposed on them. Anonymity is guaranteed all through the experiment and afterward.

### 3.2. Theoretical expectations

The production function employed in the CPR experiment (Ostrom *et al*, 1994) determines that the appropriation dilemma consists in reducing the total investment from 64 tokens (unique and symmetric Nash equilibrium) to 36 tokens (Pareto optimum).<sup>2</sup> According to standard game theory, the Nash equilibrium is supposed to obtain in all the three conditions (open-access, nonbinding communication, and costly sanctioning), because insofar as the groups' self-organized norm is nonenforceable communication is supposed to have no consequence whatsoever (cf. e.g. Harsanyi & Selten, 1988, p. 3), and "rational players" are supposed not to engage in costly sanctioning (because of its nature of public-goods), regardless if the game is one-shot or finitely repeated (Ostrom et al., 1994).

However, repeated evidences have shown both the significant effect of communication in increasing the selection of cooperative strategies in repeated interaction settings (e.g. Braver & Wilson, 1986; Bornstein, & Rapoport, 1988; Hackett et al, 1994; Ostrom et al 1994), and that many people, but not all, are willing to incur in personal cost in order to reinforce social norms and collective agreements (e.g. Henrich & Boyd, 2000; Barr, 2004; Fehr, Fischbacher & Gächter, 2002).

Our purpose is to examine the helpfulness of Graves's constructs in explaining individuals' *different* responses in face of both the communication and sanctioning conditions. More specifically, we test the hypothesis that the conventional prediction

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<sup>2</sup> The symmetric rules totalizing either 32 or 40 tokens yield the same and slightly suboptimum collective outcome.

results from to the **opportunism** that is characteristic *not* of rationality itself but of the intentional states and value judgments associated to both **3<sup>rd</sup> and 5<sup>th</sup> stages** of interior development, as described by Graves's model (Table 1). On the other hand, we suggest that the **positive effect of communication** opportunities is *not* an effect of communication per se, but a combined effect of communication and the interior dispositions of individuals centralized at the **2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> or the 7<sup>th</sup> stages** of psychosocial development. Clearly, different motivations and reasoning underlie similar behavioral responses associated to different phases of psychosocial development.

With regard to the sanctioning condition, we again expect **opportunism** to be associated with the **3<sup>rd</sup> and the 5<sup>th</sup> stages**, so that they are expected to free ride on the disposition of others to incur into the costs of the sanctioning mechanism. Graves's descriptions lead us to expect that the **use of the costly sanctioning mechanisms** should correlate positively with the scores in either **2<sup>nd</sup>, 4<sup>th</sup> or 7<sup>th</sup> stages**, but not with the scores in the 6<sup>th</sup> stage, because the 6<sup>th</sup> stage presents marked distaste for coercive means and preference for consensus. In addition, when sanctioning proceeds from individuals centralized at the **2<sup>nd</sup> or the 4<sup>th</sup> stages** it is supposed to convey some **taste for punishment**. Genuine **altruistic punishment** is supposed to follow only from individuals centralized at the **7<sup>th</sup> stage** of psychosocial development.

## **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 interwaving, 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

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 interwaving 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*, 3<sup>rd</sup> wave (Factor 1), (ii) *absolutistic*, 4<sup>th</sup> wave (Factor 2), and (iii) *sociocentric*, 6<sup>th</sup> wave (Factor 3).

Table 2  
Factor Analysis: Rotated Component Matrix<sup>a</sup>

Variable	Rescaled communalities	Rescaled Component		
		1	2	3
2 <sup>nd</sup> _most	.466	<b>.369</b>	<b>.476</b>	<b>.335</b>
2 <sup>nd</sup> _least	.592	.002	<b>-.464</b>	<b>-.614</b>
3 <sup>rd</sup> _most	.538	<b>.722</b>	.072	-.109
3 <sup>rd</sup> _least	.851	<b>-.897</b>	.124	.176
4 <sup>th</sup> _most	.733	<b>-.346</b>	<b>.783</b>	-.007
4 <sup>th</sup> _least	.733	<b>.727</b>	<b>-.453</b>	.020
5 <sup>th</sup> _most	.696	.092	-.052	<b>-.827</b>
5 <sup>th</sup> _least	.532	-.069	-.246	<b>.683</b>
6 <sup>th</sup> _most	.788	<b>-.423</b>	-.069	<b>.774</b>
6 <sup>th</sup> _least	.518	<b>.569</b>	.256	<b>-.359</b>
7 <sup>th</sup> _most	.766	.109	<b>-.850</b>	-.176
7 <sup>th</sup> _least	.521	.215	<b>.682</b>	.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<sup>3</sup>). 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. *Similar incentives, different responses: the value of the psychosocial information*

With regard to the impact of the institutional changes, our results just replicate consistent findings shown in other experimental works. They indicate that the efficiency of the collective appropriation is significantly higher ( $p < .0001$ ) in both the communication and the sanctioning conditions, in comparison with the baseline (unregulated) condition. However, these are average effects, and do not reveal the variety of individual responses to those incentive structures. Here we take advantage of such existing variability in order to verify whether the Graves's constructs help to understand both the limits and the potentialities of communication opportunities and the likelihood that a costly sanctioning mechanism might be provided.

Concerning the communication condition, we find that "unbinding" normative commitment is clearly supported by the *sociocentric* (6<sup>th</sup>) wave (Factor 3) and hazard by the *egocentric* (3<sup>rd</sup>) wave (Factor 1). Results from multivariate linear regression models wherein the three principal waves of existence figure as explanatory variables suggest that the higher the scores in *sociocentrism* (6<sup>th</sup> wave) the lower the total investment after communication ( $F_{3,192} = 2.245$ ,  $p = .019$ ), and the lower the frequency of defections during the 10 rounds of the communication condition ( $F_{3,192} = 7.883$ ,  $p = .0001$ ). Conversely, the frequency of defections is positively associated ( $p = .042$ ) with the scores in *egocentrism* (3<sup>rd</sup> wave). Since these defections may reflect not only

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<sup>3</sup> 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.

opportunism but also a punitive reaction to prior deviations of others, we set two binary logistic regressions in order to distinguish the opportunistic behavior (primary or uncalled defections) from the steadfastness in supporting the collective agreement. Results suggests that the probability of finding an individual who have stuck to the group agreement all through the 10 rounds of the communication condition, even in the face of the defections of others, is statistically higher ( $p = .001$ ) if the individual scores higher in *sociocentrism* (Factor 3). Conversely, the probability of finding an individual that have taken the initiative of cheating is higher ( $p= 0.051$ ) if the individual scores higher in the *egocentric* wave (Factor 1).

Concerning the sanctioning condition, a bivariate regression model supports the expectation that the sociocentric (6<sup>th</sup>) wave would not engage in punishment. The results show a negative relationship ( $F_{1,194} = 2.804$ ,  $p = .096$ ) between the scores in sociocentrism (explanatory variable) and the total expenditure with fees. Also, a negative relationship ( $F_{1,194} = 3.097$ ,  $p = .08$ ) between the scores in sociocentrism and total outflow due to fines restates the sociocentric adherence to the group agreement. The conclusion that this behavior expresses distaste for retaliatory means and preference for consensus instead of an attempt to free ride on sanctioning provided by others is allowed by results in the Public-Goods experiment (not shown).

With regard to the *absolutistic* (4<sup>th</sup>) wave (Factor 2), no statically significant associations were found in the CPR experiment. Yet, rather than a disinteresting sign, we attribute this fact precisely to the dramatic change in way as the self expresses its desires when development achieves the 7<sup>th</sup> stage (Table 1). What happens is that the correlations built in the Factor 2 (Table 2) show that the 4<sup>th</sup> stage strongly reject the values, style of thinking, and behavior patterns associated to the 7<sup>th</sup> stage (as it should be according to Graves's characterizations), while the expectations regarding the

behavioral responses of both systems in the experimental conditions converge. These opposing forces then collaborate to fade the statistical associations involving the Factor 2. Still, the examination of the bivariate (Pearson) correlations using the original scores from the survey data allows us to provide some evidence of the *altruistic* disposition to incur in costly sanctioning linked to the 7<sup>th</sup> stage. On the one hand, the correlations show that the *acceptance* of its values and thinking (7<sup>th</sup>\_most) is *positively* associated ( $p = .064$ ) with the total expenditures with fees, whereas the *rejection* those values and thinking (7<sup>th</sup>\_least) correlates *positively* ( $p = .060$ ) with the *frequency of defections*, suggesting that those who defect more are *not* those centered at the 7<sup>th</sup> stage of psychosocial development. Additional findings reinforcing this interpretation come from the Public-Goods and the Ultimatum game experiments (not shown).

With regard to the 5<sup>th</sup> level, we find indirect evidences of its go-getting character when we take into account that the cooperative choices associated to the *sociocentric* (6<sup>th</sup>) wave connects with the *rejection* of the values and thinking of the 5<sup>th</sup> level, as built in the Factor 3 (Table 2). A more direct observation is a significant ( $p < 0.10$ ) *positive* correlation (Pearson) between the *acceptance* of 5<sup>th</sup> stage's values (5<sup>th</sup>\_most) and the total investment in the Market 2 (the CPR) during the *baseline* condition. This relationship is confirmed by a *negative* and significant ( $p < 0.05$ ) correlation between the total investment in the Market 2 and the *rejection* of values of the 5<sup>th</sup> stage (5<sup>th</sup>\_least). We regard these correlations with 5<sup>th</sup> stage remarkable because only in the baseline condition the players are totally free to behave according to their own individual bent.

## **5. Conclusions**

In moving beyond the policy panaceas and Leviathan-like remedies to overcome social dilemma, the lack of a theory of mind that clearly specifies the relevant

psychological makeup of heterogeneous agents renders prediction of behavior in those situations virtually impossible. While the use of simulation models offers an interesting alternative, the evolutionary approach to social behavior entails a commitment with a sociobiological framework which is at least rather problematic, from the empirical point of view (Heath 2007).

On the other hand, the paradigm of developmental structuralism offers a series of empirically grounded theories and model of human valuation that can be tested to predict *diverse* behavioral responses to similar incentive structures in social dilemma situations. Our results point toward the worthiness of one of them. Designed to rationally reconstruct the pretheoretical knowledge of competently judging subjects, Graves's constructs showed to be useful predictors of individuals' dispositions to commit themselves with self-organized norms and incur into the costs of providing sanctioning mechanism to overcome social dilemmas.

Acknowledged, further research is needed in order to produce additional evidences of the connection between groups' ability to overcome social dilemmas and the stages of interior growth of the individuals in interaction. We claim that efforts in this direction should be supported due to both the evident policy implications and the emancipatory drive set in the developmental point of view. Actually, if the qualitative changes showing *decreasing egocentrism* and *increasing moral embrace* present in most developmental models really obtain (cf. Wilber. 2000), as our result also suggest, then 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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