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**FEAR OR GREED? DUTY OR SOLIDARITY?
MOTIVATIONS AND STAGES OF MORAL
REASONING: EXPERIMENTAL EVIDENCES
FROM PUBLIC-GOODS PROVISION DILEMMAS**

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Fear or Greed? Duty or Solidarity? Motivations and Stages of Moral Reasoning: Experimental Evidences from Public-Goods Provision Dilemmas

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Abstract

As economists increasingly recognize the limits of the canonical self-interest assumption, the lack of a theory of human valuation that clearly specifies what determines an individual's utility judgments renders the prediction of behavior in social dilemmas virtually impossible. In this study, we examined the explanatory power of a structuralist-constructivist theory of adult development and this theory's analytical significance to the understanding of behavioral diversity in situations where individual and collective interests collide. Experimental results suggest that the theoretical constructs built into the selected theory provide a reliable basis for predicting participants' behavior when presented with two different collective-action dilemmas under diverse institutional conditions.

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1. Introduction

Although a fully articulated, general theory of the affect institutional incentives have on individuals and their behavior in collective-action situations has not been developed, there is growing consensus among those social and political scientists focused on social dilemmas that the conventional economic theory of externalities is a special case of a more general theoretical structure (Ostrom, 2007; Frohlich & Oppenheimer, 2001).

Clearly, the essence of social dilemmas, such as the appropriation of a common-pool resource or the provision of a public good, is inseparable from the existence of market externalities and the inherent payoff structure. These dilemmas often embroil an individual in a decision situation where his interests and the group's interests collide. Without questioning the generalisability of the economic postulate of rationality, conventional theory considers that the individual facing this type of conflict is trapped in the "inherent logic" of the situation (Hardin, 1968). Accordingly, these individuals are said to be facing a "social dilemma:" they would all be better off if they found a way to cooperate, but there is no incentive for the individual to bear the costs of cooperation (Ostrom, 2007).¹ As a result, conventional theory repeatedly advocates that institutions designed to prevent the "tragedy of the commons" should first address the fundamental problem of property rights—whether public or private—and second be aware that regulations often must be *imposed* by external authorities acting in the public interest, assuming that these authorities can devise the proper institutions (Ostrom, 2007).

¹ Basically, a rule to cooperate to solve the dilemma has the character of a *public good*: the entire community benefits from that rule, whether they contribute for its provision or not. Under the assumption of self-interest, this rule creates a second-level, same-type dilemma on-top of the initial dilemma, which is inconsistent with the conventional theory that the same "helpless" participants, trapped by the inherent logic of the commons, solve a second-level dilemma in order to address the first-level dilemma.

Scholars have learned that problems of overharvesting and the misuse of ecological systems are rarely due to a single cause (Ostrom, 2005). Field and laboratory research focused on social dilemmas have shown that individuals' behaviors in these situations are affected not only by the structural characteristics of the outcomes but also by the structural characteristics of the group (size, leadership, inter-communication), and the specific content or context of the dilemma (investments, social events, environmental issues) (Kollock, 1998; Komorita & Parks, 1995; Kopelman et al., 2002; Lepyard, 1995; Van Lange, Liebrand, Messick, & Wilke, 1992; Ostrom, Gardner & Walker, 1994; Poppe, 2005).

Much of the research about social dilemmas has been focused on the identification of sets of variables that act to mitigate social losses associated with conflicts between the individual and the collective in the face of externalities (Ostrom 1990; Schlager 1994; McKean 1992, 2000; Tang 1994; Ostrom et al. 1994; Wade 1996; Baland & Platteau 1996; Agrawal 2001). The puzzle is that these structural and contextual variables also interact with the characteristics of the *individuals* involved, so that different individuals may respond differently to objectively similar incentive structures and contexts of action: different individuals often have different attitudes towards existing information, perceived uncertainty and risk, inter-communication, and authoritarian figures.

The implications of an individual's attributes are particularly important in social dilemma situations because of the essentially *moral* nature of the choices that must be made when individual and collective interests collide.² Due to the moral nature of many social dilemmas, the aprioristic notion that all preferences are self-centered, as the

² As Heath (2007) indicates, while there are many aspects of morality that are puzzling, perhaps the most puzzling is that it often requires us to act in ways that are contrary to our self-interest. "We may find ourselves *wanting* something, but feeling that morality prohibits us from doing what is necessary to obtain it. Morality therefore presents itself to us in the form of a duty to refrain from the pursuit of individual advantage, or to use the more technical term, in the form of a *deontic constraint*."

standard theory postulates, does not provide adequate explanatory depth. By implicitly equating utility with profits and rationality with self-interest, one actually dismisses the need to understand how individuals reach *utility judgments*. While this might be a reasonably scholarly strategy for modeling behavior in highly competitive market settings, as Ostrom (2005) puts it, it is not so when addressing most social dilemmas. These situations often evoke the participants' *internal values*, which may not be monotonically related to the objective payoff (ibid, Gintis, 2000; Camerer, 2003).

Once it is recognized that intrinsic values matter when addressing morally relevant conflicts of action, one must then realize that the situation is one of incomplete information: one agent cannot know exactly how other agents are valuing alternative actions and outcomes (Ostrom, 2005). Finally, conventional risk analysis cannot adequately determine the effect of institutionally sponsored incentives on the successful resolution of a social dilemma, for how does one accurately discount individual morality, but must be expanded to include the application of discrete rules of thumb or heuristics (cf. Heiner, 1983).

This is possibly why Ostrom (2005) suggests that the major theoretical challenge facing those studying today's social dilemmas is the development of an appropriate family of assumptions regarding the intrinsic values individuals place on actions and outcomes—particularly outcomes obtained with others:

“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.”

We suggest that the constructivist-structuralist conception of human development has led to theories and findings of great relevance to our understanding of

human valuation; and as this understanding improves, so does our ability to construct institutions that better resolve social dilemmas. A central tenet of developmental psychology is that to produce the expected results, the incentive structure should be tuned to the characteristics of each psychosocial centralization stage, as motivational needs, aims, and means differ between each stage. The substantive significance of a developmental framework to the resolution of social dilemmas is emphasized by the growing consensus among developmental psychologists that (i) *psychological development is not upper-bounded*, i.e., it is not limited to the childhood and adolescence, as traditionally assumed, and (ii) open-ended, multi-stream, complex interior growth is a process that involves a *continuing decline in egocentrism, increasing autonomy and an increasing ability to take other people, places, and things into account* when making decisions that affect the well-being of others (Wilber, 2000, 2001; cf. also Commons, 1981, 2000).

The broad study seeks to explain and predict behavior in collective action situations using alternative theories and models of adult development. This paper is rooted in the constructs of a selected developmental theory; one that is particularly suited to the examination of behavior in situations where individual and the collective interests collide.

We began by assessing the psychosocial profiles of 322 Brazilians who were potential participants in three experiments: a laboratory common-pool resource appropriation dilemma, including communication and sanctioning conditions, a stepwise public-goods provision dilemma with variable levels of required contribution, and the standard Ultimatum game. We carried out factor analysis on data from the initial psychosocial survey of the experiments' participants to pretest the cross-cultural robustness of the theoretical constructs set in the chosen developmental model. The

procedure resulted in three quite meaningful principal factors, which represented three principal psychosocial centralization stages present in our sample. The participants' behaviors in the different experimental situations were then analyzed statistically to find out whether they conform with a set of theoretical expectations derived from Graves's theory, as well as with the general features of human internal development (*declining egocentrism, increasing autonomy, increasing awareness*). Experimental results suggest that the theoretical constructs built in the chosen developmental model provide a reliable basis for predicting behavior in the situations we examined and that a greater willingness to cooperate is indeed associated with higher stages of psychosocial development. In this paper we summarize the results from the public-good game (PGG) experiment. Results from the common-pool resource (CPR) experiments can be found in Meyer and Braga (2009). The conjunct of all experimental results is reported in Meyer (2006).

The following section briefly outlines Clare Graves's "Emergent Cyclical Levels of Existence Theory" (Graves, 1970, 2005). The paper continues with a summarization of the methods and procedures used in this study. It then puts forward our hypotheses, presents and analyzes results from the experiments, and closes with our conclusions and a discussion of the study's policy implications.

2. The *biopsychosocial* waves of agency and communion,

Graves's theory postulates that the *biopsychosocial* development of human beings arises from the interaction of a double-helix complex of two sets of determining forces: environmental social determinants and the organism's neuropsychological survival equipment. After about a decade of careful empirical research, Graves (1970) conceptualized eight emergent stages, or waves, of interior growth in *adult* humans.

These stages are states of biopsychosocial equilibrium, comprised of a perception of the environment and a reciprocal neurochemical balance, and are reflected in a social construction that then influences the mental equilibrium. In Graves's words,

“The psychology of the adult human being is an unfolding, ever-emergent process marked by subordination of older behavior systems to newer, higher order systems. The mature person tends to change his psychology continuously as the conditions of his existence change. Each successive stage or level of existence is a state through which people may pass on the way to other states of equilibrium. When a person is centralized in one of the states of equilibrium, he has a psychology which is particular to that state. His emotions, ethics and values, biochemistry, state of neurological activation, learning-systems, preference for education, management and psychotherapy are all appropriate to that state. If he were centralized in some other state, he would think, feel and be motivated in manners appropriate to that state. He would have biochemical characteristics and a state of neurological activation particular to it. When in a certain state, he would have opened only certain systems for coping and learning. Thus, he would respond most positively to education, management, and therapy which are congruent with that state. And he would have to respond negatively to forms of education, management and therapy not appropriate to the state of his centralization” (Graves 2005, p.29-30).

Graves's sweeping statement is subject to the currently accepted understanding that most of the multiple lines or streams of consciousness that comprise human interiority makeup decomposable subsystems that develop in a relatively independent

fashion (Wilber, 2001, p. 44). As a result, a person can be very advanced in some lines, medium in others, and low in others—all at the same time. Hence, it is not quite appropriate to talk about general “levels of existence” as no sequential development can possibly be devised when considering the sum total of all these different lines.

However, as Wilber (2001) reports, “the bulk of research has continued to find that each developmental line itself tends to unfold in a sequential, holarchical fashion,” meaning (i) that higher stages in each line tend to build upon or incorporate the earlier stages of that line, (ii) that no stage can be skipped, and (iii) that the stages emerge in an order that cannot be altered by environmental conditioning or social reinforcement.

With these caveats and core ideas in mind, the special significance of Graves’s theory to our understanding of the interplay among cognition, values, and institutions in collective-action settings is rooted in the very structure and focus of his model. The substance of Graves’s constructs resides on revealing the different sets of values individuals place on actions and outcomes affecting others’ well-being. Graves’s model puts forward the notion that people tend to oscillate between two fundamental stances, between “me” (agency) and “we” (communion) (Cowan & Todorovic, 2005). According to Graves’s model, this cyclical turn produces two basic behavioral systems, *express-self* systems and *sacrifice-self* systems (Table 1), which have manifest implications for the analysis of conflicts between individual and collective interests.

The holarchical organization of Graves’s stages indicates that interior awakening brings about new, emergent capacities marked by broader perspectives, resulting in a sequence showing *decreasing* egocentrism and *increasing* behavioral freedom. Wilber (2000, 2001) indicated that these features express what is possibly the most convergent characteristic in the field of developmental psychology. The decrease in egocentrism is made evident in the progression from the 3rd to 5th to 7th stages in Graves’s schema

(Table 1). It should be noted that the whole scheme implies a widening moral embrace, i.e., of those who are considered worthy of moral concern. Behavioral freedom and autonomy increase as new capacities are added along the developmental path. As suggested previously, stages of development are *not* rigid levels but flowing waves with much overlap and interweaving, a meshwork or dynamic spiral of unfolding consciousness (Wilber, 2001; Beck and Cowan, 1996). But still, convergent research findings indicate that stages of centralization can be defined as *whole-part discrete totalities* (holons), which bring about certain behavioral patterns representing the preferred ways of coping.

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

Stage or wave	Cyclical aspect	Thinking	Basic theme
8 th	Sacrifice-self (communion)	Holistic	<i>Adjust to the realities of one's existence and accept the existential dichotomies as they are and go on living.</i>
7 th	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 th	Sacrifice-self (communion)	Consensus	<i>Sacrifice now in order for all to get now.</i>
5 th	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 th	Sacrifice-self (communion)	Authority	<i>Sacrifice self now to receive reward later.</i>
3 rd	Express-self (agency)	Egocentric	<i>Express self, to hell with others and the consequences, lest one suffer the torment of unbearable shame.</i>
2 nd	Sacrifice-self (communion)	Animistic	<i>Sacrifice self to the way of your elders.</i>
1 st	Express-self (agency)	Instinctive	<i>Express self as just another animal according to the dictates of one's psychological needs and the environmental possibilities.</i>

Source: Author's configuration based on Graves (2005) and Beck and Cowan (1996)

In spite of the subtleness and caveats of Graves's concept, his model has evident implications in the analysis of social dilemmas. While specific behavioral hypotheses must wait until we have presented the experimental conditions, it is clear that we should expect individuals centered in one of the sacrifice-self stages (2nd, 4th, 6th, 8th) or the express-self 7th stage to have more cooperative dispositions than individuals centered in the express-self 1st, 3rd and the 5th stages, which should be especially evident when individual and collective interest collide.

3. Method

To begin our test of the explanatory and predictive value of Graves's constructs in regards to collective-action dilemmas, the psychosocial profiles of 322 potential Brazilian participants were assessed by means of a survey designed using an authorized translation of a tool developed by Hurlbut (1979), in collaboration with the National Value Center (NVC) Inc.. From the total number of respondents, 127 participants (62 female and 65 male) actually took place in the public-goods provision dilemma experiment (PGG).

3.1. Recruitment procedures and characteristics of the sample

For the most part, the experiment participants were undergraduate and graduate students from various major programs at the Federal University of Viçosa (UFV). Forty-three percent were between 18 and 21 years old, 52% were between 22 and 29, 10 people (3%) were in their thirties, 3 were in their forties, and one individual was in his fifties. Ninety-two percent were from the Brazilian state of Minas Gerais, 3% were from São Paulo, 2% were from Rio de Janeiro, and the remaining participants were from Bahia, Espirito Santo, Brasília (D.F), and Pará. Identification numbers were randomly distributed to each individual to preserve anonymity.

3.2. Experimental settings and general procedures

The experiment was conducted in a UFV Department of Agricultural Economics classroom. Due to scheduling issues and limited space in the classroom, the experiment was performed in six separated experimental sections. In each section, participants were told (and this was actually the case) that 172 people had answered our call and were scheduled for taking part in the experiment. It was anticipated that, owing to normal absences, we could expect about 120 to 140 subjects effectively participating, and thus making decisions that would impact the provision of the “public good.” While discussion between the participants was not allowed during the experimental sections, post-experiment communication among acquainted participants could not be avoided. Both the very nature of provision dilemma and the large number of participants rule out the concern that cooperation could result from uncontrolled post experiment communication.

3.3. The assessment tool

The assessment tool consisted of a survey taken using forty multiple choice questions in a *Most Like Me / Least Like Me* format (Values Profile). This tool was designed to reveal a person’s psychosocial profile (from 2nd to 7th stages)³ with reference to his/her overall lifestyle and not to any compartmentalized area of life, such as profession or religious belief. Although a personality is thought to be formed by a mix of different value systems, Hurlbut’s test is designed to reveal a person’s dominant value system, then secondary value system, and so on.

³ The 1st and the 8th stages are not covered by the assessment tool. The behavioral systems associated with the 1st level are conjectured to hold for approximately 0.1 percent of the world adult population (Beck & Linscott, 1991; Wilber, 2001), and is present in senile elderly, late stage Alzheimer’s patients, the mentally ill and the starving. The 8th level is thought to be relatively rare and represents the “leading edge” of *collective* human evolution. Some 8th level’s intellectual products include Teilhard de Chardin’s concept of noosphere, the growth of transpersonal psychology, chaos and complexity theories, integral-holistic systems thinking, and Gandhi’s and Mandela’s pluralist integration (Beck & Cowan (1996).

Table 2 lists the six selected value systems and illustrates a statement representative of each system given in response to one of the survey questions.

Table 2. Statements representative of each stage of psychosocial development, from survey question responses.

FOR ME THE WORLD IS...			
Stage or wave	Cyclical aspect	Thinking	Representative statement
7th	Express-self (agency)	Ecological	<i>a chaotic organism forged by differences and change</i>
6th	Sacrifice-self (communion)	Consensus	<i>a human habitat in which we share life's experiences</i>
5th	Express-self (agency)	Strategic	<i>a market place full of possibilities and opportunities</i>
4th	Sacrifice-self (communion)	Authority	<i>an ordered existence under the control of the ultimate truth</i>
3rd	Express-self (agency)	Egocentric	<i>a jungle where the strongest and most cunning survive</i>
2nd	Sacrifice-self (communion)	Animistic	<i>a magical place alive with spirit beings and mystical signs</i>

Source: Adapted from Beck (1999)

Hurlbut's test is assumed to be valid only for speakers of standard American English and persons with the equivalent of a high school education. Due to necessity, and under the consent by the National Values Center (NVC) Inc., we employed a Portuguese translation of Hurlbut's test to examine Graves's claim that the biopsychosocial concept is cross-culturally valid (Graves, 2005, p. 4).

3.4. Factor Analysis: pretest of the cross-cultural robustness of Graves's constructs

The burden of proof of a theory that grounds a concept of human valuation in anything more general than the “settled convictions” of a culture is enormous. In this regard, the main contribution of our experimental work is to test a series of theoretical expectations derived from Graves's constructs vis-à-vis participants' behavior under different experimental conditions. The wave-like, flowing phenomenon underlying Graves's concept of interior growth means that his stages or “levels of existence” impart only *nodal* positions, or “centers of psychosocial gravity,” not the *total* systemic manifestation of concrete individuals. However, these nodal positions must follow an invariant sequence so that the interweaving of value systems does not occur at random but follows a certain logic of mutual evaluative perspectives. We claim that if the factor analysis generates theoretically meaningful components from a nonarbitrary pattern of correlations between the *Most Like Me / Least Like Me* survey variables produced in our sample of Brazilian participants, this result is a sign of the cross-cultural robustness of Graves's general scheme.

3.5. Public-goods (PGG) provision dilemma

3.5.1. Experiment summary

This experiment was a step-level give-some dilemma based on Poppe and Zwikker (1996). Everyone gained if enough participants contributed. Discussion between participants was not allowed during the experiment. The experiment was made up of 127 subjects (62 female, 65 male).⁴

The experiment consisted of nine trials. In each trial, every participant had R\$0.50 (US\$0.25) at his disposal. The participants were asked to decide whether they

⁴ There was missing case regarding the Values Profile, leaving only 126 statistical tested cases.

would keep the R\$0.50 or would contribute them to a common pool. If at least X percent of the participants contributed to the pool, all participants would receive R\$1.00. If a participant contributed but not enough others contributed, the participant would lose the contribution. In each trial, the participant could get R\$0.00 (contributed but not enough others contributed), R\$0.50 (did not contribute & not enough others contributed), R\$1.00 (contributed & enough others contributed), or R\$1.50 (did not contribute but enough others contributed).

The percentage (X) of total participants who had to contribute in order for all to receive the R\$1.00 bonus varied in the nine trials. Sequentially by trial the percentages were 40%, 70%, 10%, 60%, 90%, 30%, 50%, 80% and 20%. Before every trial, each participant was asked to indicate what percentage of all participants he/she expected to contribute. To insure that the participants give their best-guess estimates, the participant with the most accurate estimate at the end of each trial received a R\$5 bonus.

The motives underlying a participant's decision to contribute or not were determined by comparing the participant's expectations with their actual decisions. If the participant did not contribute, the motive could be *greed* or *fear* (of losing R\$0.50), 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* or a sense of *duty* (contributed though not believing enough would contribute). For each motive a dichotomous score reflected the presence or absence of that motive in a trial (Figure 1).

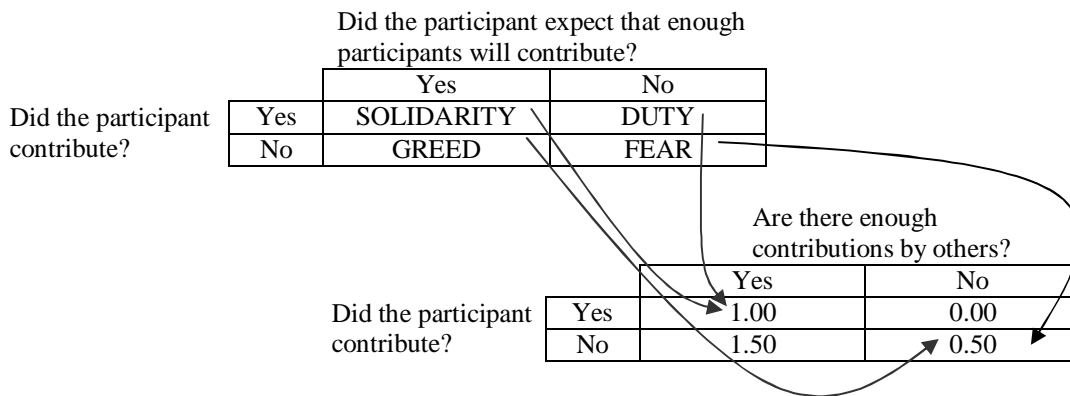


Figure 1. Public good experiment: motives and final outcomes.

3.5.2. Theoretical expectations

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 (dominant strategy--not contribute) irregardless of the level of contribution required. The theory makes no distinction between alternative motives and tacitly identifies the decision of not contributing with the rational choice. Other public-goods experiments have shown that the required level of contribution, the context, and the actual content of the decision affect participants' behavior (Poppe, 2005; Kopelman et al, 2002; Kollock, 1998; Komorita & Parks, 1995; Lepyard, 1995; Van Lange et al, 1992). Our study seeks to determine how participants' decisions and motivations relate with Graves's stages of psychosocial development and if interior growth brings forth an increased willingness to cooperate for the provision of public goods.

In regards to the average frequency of contributions over the nine trials we posit,

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

As for the motivations underlying each of the possible decisions, we posit,

PGG_motivations to contribute: *individuals centered in the 2nd, 4th, or 6th stages would cooperate out of both solidarity and sense of duty. Individuals centered in the 5th and 7th stages would cooperate out of solidarity but not from a sense of duty; while those in the 3rd stage are not ever expected not to cooperate.*

PGG_motivations to not contribute: *when individuals centralized at the 2nd, the 4th, the 6th or the 7th stages decide not to cooperate, the underlying motive should be fear but not greed. The motives underlying the refusal to cooperate on the part of individuals centered in either the 3rd or 5th stages of psychosocial development may be either fear or greed.*

4. Results

4.1. Factor analysis suggests that Graves's scheme is cross-culturally robust

Table 3 presents the component matrix from factor analysis applied to the survey data. The moderate communalities indicate that survey scores are considerably scattered along the tridimensional space defined by the principal axes. Such dispersion reflects the natural overlapping and interwaving of the different psychosocial perspectives, as discussed earlier. What matters most is that the correlation pattern in the component matrix reveals three theoretically sound principal nodal waves of existence: the *egocentric* wave (Factor 1, Table 3), best represented by 3rd stage thinking; the *absolutist* wave (Factor 2), best represented by 4th stage thinking; and the *sociocentric* wave (Factor 3), as best represented by 6th stage thinking. Taken together, these three components explain about 70% of the sample's total variance (Factor 1 = 23.44%; Factor 2 = 22.15%; and Factor 3 = 24.56%, after Varimax rotation⁵).

We believe that the theoretical meaningfulness of these principal nodal waves of existence is an indication of the cross-cultural robustness of Graves's constructs. If this

⁵ 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.

were not the case, there would be no reason to expect theoretically sound mutual evaluations involving these constructs in a sample of Brazilian participants assessed nearly three decades after their design in the United States. Our claim is supported by associations between the factor scores and the behavior produced under our study's experimental conditions, which will be discussed in the following paragraphs.

Table 3
Factor Analysis: Rotated Factor Matrix^a

Variable	Rescaled communalities	Rescaled Component (Factor)		
		1	2	3
2 nd _most	.466	.369	.476	.335
2 nd _least	.592	.002	-.464	-.614
3 rd _most	.538	.722	.072	-.109
3 rd _least	.851	-.897	.124	.176
4 th _most	.733	-.346	.783	-.007
4 th _least	.733	.727	-.453	.020
5 th _most	.696	.092	-.052	-.827
5 th _least	.532	-.069	-.246	.683
6 th _most	.788	-.423	-.069	.774
6 th _least	.518	.569	.256	-.359
7 th _most	.766	.109	-.850	-.176
7 th _least	.521	.215	.682	.104

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

We will skip comments on the 2nd stage of psychosocial development, which was plausibly shown to be less useful for distinguishing the *nodal* positions present in a sample of undergraduate and graduate students. Factor 1 (*egocentric wave*) is best represented by the statements, values, and worldview associated with the 3rd stage (Table 1) and least represented by both the 4th and 6th stages, as demonstrated by data

shown in Table 3: positive correlations with 3th_most and negative correlations with 3th_least; positive correlations with 4th_least and 6th_least and negative correlations with 4th_most and 6th_most. On the other hand, Factor 2, (*absolutist* wave) is best represented by the statements and authoritarian view linked with the 4th stage (Table 1) and is expected to be strongly rejected by the 7th stage worldview (Table 3). Factor 3 (*sociocentric* wave) is best represented by statements associated with the 6th stage and strongly distanced from positions linked with the 5th stage, as expected. We have skipped comments on the 2nd stage; which was plausibly shown to be less useful for distinguishing the *nodal* positions present in our sample.

4.2. PGG experiment

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

Table 4 presents data from the PGG experiment grouped into three broad levels of contribution: low, medium, and high. These data includes the distribution of revealed expectations, actual decisions made, and the motives underlying those decisions.

Although the level of needed contribution caused great variation in expectations and actual contribution, data show that an average of 51.4% of the participants expected enough other participants would contribute and an average of only 26.2% actually contributed. Given this general lack of contribution, the experiment participants received the public good in only three of the nine PGG trials, those which required less than 40% participation. In the 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 tests with the contribution level as the within-subject factor. If an ANOVA test showed a significant effect from the contribution level, a linear trend analysis was performed. It was found

that the contribution level had significant effect on participant expectations, decisions, and underlying motivations. Reasonably, as the percentage of contributors needed rose, the number of contributors fell as did their expectations as to the number of others that would contribute (Table 5). Participants showed more *fear* and sense of *duty* and less *greed* and *solidarity* as the required percentage of contributors rose. These observations make perfect sense in terms of *average* behavior. We will now explore behavioral variability as the incentive structure changes to determine if stages of psychosocial development help to explain the participants' decisions and motivations.

Table 4
Percentage of participants who did (not) expect enough others to contribute, did (not) contribute themselves, and their motivation: fear, greed, solidarity, or duty

		Participant expected that enough participants contributed					
		No		Yes		Both	
Participant did not contribute		<i>Fear</i>		<i>Greed</i>			
	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	
Participant contributed		<i>Duty</i>		<i>Solidarity</i>			
	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 5
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.

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

Results from multivariate regression analysis using the three principal factors as predictors (Table 6) suggest that contribution to provide the public good is supported mainly by individuals scoring higher in the *sociocentric* wave (Factor 3). This result concurs with the 5th and 6th stage tendencies noted in tables 1 and 3, the Factor 3 figures in Table 4, and substantiates our **PGG_contributions** hypothesis.

Table 6
Linear multivariate regression dependent variable: participant contributed to 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

Source: Research results

The results in tables 7 and 8 relate to the underlying motives for decisions made by individuals centered at different psychosocial development stages in the PPG experiment and are broadly in agreement with theoretical expectations. The results show that *greed* as a motive for not contributing correlates positively with *acceptance* of the 3rd and 5th stage attitudes and negatively with rejection of these attitudes, as suggested in the **PGG_motivations to not contribute** hypothesis. The motive *greed* is *negatively* correlated with Factor 3 (*sociocentrism*). The significant negative correlation between *fear* and acceptance of the 6th stage attitude was not predicted.

Table 7
Pearson bivariate correlations: motives and payoff (n = 126)

Survey variables and Factors	Motive of decision				Total payoff
	"Fear"	"Greed"	"Duty"	"Solidarity"	
2 nd _most	-0.009	-0.058	0.125*	0.012	-0.047
2 nd _least	-0.079	0.209***	-0.051	-0.078	0.073
3 rd _most	-0.065	0.139*	0.063	-0.078	0.023
3 rd _least	0.002	-0.142*	-0.027	0.139*	-0.119*
4 th _most	0.094	-0.111	-0.015	-0.001	-0.011
4 th _least	0.065	0.103	-0.062	-0.144*	0.169**
5 th _most	0.011	0.176**	-0.171**	-0.102	0.163**
5 th _least	-0.030	-0.197**	0.218***	0.124*	-0.192**
6 th _most	-0.151**	-0.105	0.169**	0.202**	-0.230***
6 th _least	-0.041	0.087	-0.023	-0.022	0.035
7 th _most	0.112	0.006	-0.097	-0.095	0.122*
7 th _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

In regards to the decision to contribute, the motives *solidarity* and *duty* correlate positively with higher scores in Factor 3 and with *acceptance* of the 6th stage attitude, supporting our **PGG_motivations to contribute** hypothesis. *Duty* correlates negatively with acceptance of positions linked with the 5th stage (and positively with its rejection),

and *solidarity* correlates negatively with scores in Factor 1 (egocentrism). The positive correlation between *duty* and *rejection* of the 3rd stage attitude and the negative correlation between *duty* and *rejection* of the 4th stage attitude also support the **PGG_motivations to contribute** hypothesis.

No statistically significant coefficients were found in multiple regressions or multinomial logistic models where the three principal factors were able to predict motives; yet, by using the frequency of the motives' appearance as predictors of the factor scores, we were able to confirm the relationships between the four different motives and Factor 3. These results are presented in Table 8. Due to multicollinearity, each multinomial model excludes one motive. The models confirm that *solidarity* and *duty* are positively associated with factor scores in *sociocentrism* (Model 1) and that *fear* and *greed* are negatively associated with factor scores in *sociocentrism* (Model 2).

Table 8
Linear multivariate regression dependent variable: sociocentrism (all trials)

<i>Motive</i>		<i>Sociocentrism (Factor 3)</i>	
		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. Conclusion and implications

There is increasing recognition among institutional and behavioral economists of the limits of economic theory's standard model of the individual and a growing consensus that a number of structural and contextual variables enhance the likelihood of self-organization in collective-action settings. As Henrich et al (2004) put it, empirical challenge to the selfishness axiom have fostered a number of reformulations of individual utility functions and other behavioral foundations consistent with the evidence from across a variety of experimental settings (Fehr & Schmidt 1999, Falk & Fishbacher 1998, Charness & Rabin 1999) as well as attempts to explain the long term evolutionary success of non-selfish behaviors (Simon 1990, Caporael et al 1989, Henrich & Boyd 2000, Boyd et al. 2001, Sober & Wilson 1994, Smith et al. 2001). However, the lack of a theory of human valuation that explains how individuals reach diverse utility judgments when faced with *similar* incentive structures hinders the advancement of a more comprehensive theory of how incentives affect individuals when confronted by a social dilemma. The theoretical advancement in this field is particularly challenged due to the moral aspect of choice situations wherein the individual and collective interests collide.

We suggested that the paradigm of developmental structuralism offers a series of empirically grounded theories and models that adequately address the development of socio-cognitive, moral reasoning, which are of real significance for addressing morally relevant conflicts of action, as most social dilemmas. Our results point towards the worthiness of Graves's model as one that could be used to predict the *diverse* behavioral responses to incentive structures created to resolve social dilemmas. Graves's constructs were shown to be practical tools that simplified the interpretation of heterogeneous behavior exhibited by participants in different collective-action dilemmas under varied

institutional conditions; yet, further testing is needed to determine the range of this psychosocial model's predictive ability.

The policy implications linked with the developmental point of view ensues from both the structural features involved and the qualitative changes brought about along the developmental path. On one hand, the holarchical assembly of Graves's stages means that an individual's interior perspectives emerge in an order that cannot be altered by external conditioning or social reinforcement, as the process of consciousness awakening follows its own internal laws of transformation and is not simply imported from the external world. On the other hand, there is a great consistence among alternative developmental models in their description of the awakening process as a continuous decline in egocentrism, an increase in autonomy, and an increase in moral embrace. If one takes these features seriously when analyzing and recommending institutions intended to overcome social dilemmas, one cannot avoid the conclusion reached by Graves (2005, p. 482-3) that the prime goal of institutional designers should be to devise institutions designed first and foremost to promote human movement up the spiral of unfolding consciousness.

6. References

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