

**EXPLORING MACROCONTINGENCIES AND
METACONTINGENCIES: EXPERIMENTAL AND
NON-EXPERIMENTAL CONTRIBUTIONS**
**EXPLORANDO MACROCONTINGENCIAS Y METACONTINGENCIAS:
CONTRIBUCIONES EXPERIMENTALES Y NO-EXPERIMENTALES**

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ABSTRACT

Keywords:

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The study of cultural practices is originally a focus of social sciences, especially during seminal studies in anthropology and sociology, later influencing other areas. In Behavior Analysis, a psychological approach, Skinner stressed the importance of studies on social behavior involving institutions and large groups, as early as in 1953 on his book "Science and Human Behavior." In the 1980s, Glenn gave a significant contribution to the area proposing the concepts of metacontingency and macrocontingency. Her innovation has been followed by many studies investigating the contribution of adopting these concepts for the analysis of cultural practices. This article presents some non-experimental and experimental lines of research that focus on the maintenance and transmission of cultural practices. Metacontingency and macrocontingencies elements were analyzed in the Brazilian public health system and in family interactions. Laboratory microsocieties as a research tool that attempts to unveil the contingency relations within small groups are also described. Cultural consequences associated to the selection function of culturants have been observed in these studies. Suggestions for future research of other variables which may improve the comprehension of the selection of cultural practices are also presented.

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RESUMEN**Palabras clave:**

prácticas culturales,
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familia, micro sociedades
de laboratorio

El estudio de prácticas culturales es originalmente un foco de las ciencias sociales, especialmente durante los estudios seminales en antropología y sociología, influyendo, posteriormente, en otras áreas. En Análisis del Comportamiento, un enfoque psicológico, Skinner enfatizó la importancia de los estudios en comportamiento social conllevando instituciones y grupos grandes, ya en 1953 en su libro "Science and Human Behavior". En la década de 1980 Glenn aportó una contribución significativa para el área proponiendo los conceptos de macrocontingencia y metacontingencia. Su innovación ha sido seguida por muchos estudios averiguando la contribución de adoptar esos conceptos para el análisis de las prácticas culturales. El presente artículo presenta algunas líneas de investigaciones no-experimentales y experimentales que se centran en el mantenimiento y la transmisión de las prácticas culturales. Elementos de la metacontingencia y macrocontingencias fueran analizados en el sistema público de salud brasileño y en interacciones familiares. Se describen igualmente las micro-sociedades de laboratorios como una herramienta de investigación que intenta revelar las relaciones de contingencia en grupos pequeños. Se han observado en estos estudios Consecuencias Culturales relacionadas a la función de selección de culturantes. Adicionalmente se presentan sugerencias para una futura investigación de otras variables que puedan mejorar la comprensión de la selección de prácticas culturales.

Analysis of social issues from a radical behavioral perspective was first made by Skinner (1948; 1953; 1971; 1978) and has received growing attention from other behavior analysts since the 1980s. Similarly, since the 1960s there has been an increase in studies focusing verbal relations (McPherson, Bonem, Green & Osborne, 1984), which also shows a broader view of human behavior and its complexity in this approach. Malagodi and Jackson (1989) highlighted the current interest of behavior analysts in themes that were traditionally addressed by social sciences, reflecting the expansion of the application of principles of behavior analysis from an individual level to a group or cultural level. This new field of research for behavior analysts suggests some proximity among their approach, Wright Mills' (1916-1962) sociology and Marvin Harris' (1927-2001) cultural materialism.

According to the causal model considered in behavior analysis, as well as the concept of functional analysis, the principle of selection by consequences is defined based on three levels of variation and selection - phylogenetic, ontogenetic and cultural. All of these levels have to be

considered in each individual's environmental history (Skinner, 1953) to explain specific patterns of behavior of that unique person. When considering the behavior of a group of individuals, it is also important to take into account these same levels, which include social and non-social contingencies, so it will be possible to understand behavioral patterns presented in a given community. "Since a species which quickly acquires behavior appropriate to a given environment has less need for an innate repertoire, operant conditioning could not only supplement the natural selection of behavior, it could replace it." (Skinner, 1981, p. 501). In this process of learning, a refinement of the individual's behavioral repertoire occurs through increasingly complex relations: in the innate repertoire, social repertoires are acquired through imitation; phylogenetic imitation is complemented with operant modeling, and also with environmental control in the case of individuals being alone and no longer controlled by a specific behavior of a given model (Skinner, 1984).

The evolution of social environments or cultures is closely related to verbal behavior deve-

lopment (Guerin, 2001; Leite & Souza, 2012; Skinner, 1981) in such a way that verbal relations expand the possibilities by which one individual helps or gets help from others. In a behavioral approach, a culture may be described as contingencies of social reinforcement maintained by a group (Skinner, 1987) which result in a network of interacting people that makes lives possible (Guerin, 2001). Thus, evolution of a culture occurs when practices adopted by a group of individuals contribute to the solution of collective problems and become important to the survival of the culture itself (Glenn & Malott, 2004; Skinner, 1981). Once this happens, cultural practices are selected and transmitted among different generations. Emphasis in this kind of analysis is on the effects of such practices on group and not individual reinforcement contingencies.

Selection by consequences is a critical concept to any behavioral analysis in different contexts once many other concepts adopted by behavior analysts derive from it, such as behavioral contingencies, *macrocontingencies* and *metacontingencies*. Glenn (see 1985, 1986, 1988, 2004; Glenn & Malott, 2004) introduced the *metacontingency* concept as a unit of analysis which describes relationships amongst functional operant classes. Each of these classes is described by three-term contingencies, the most basic unit of analysis. When these contingencies occur in a recurrent and interdependent form - *interlocking behavioral contingencies* (IBCs) - they produce cumulative effects, which are beyond the consequences directly linked to each of them. Glenn called this different set of long-term consequences an *aggregate product*. An external environment of IBCs and aggregate product produce *cultural consequences* that select IBCs and control the individual operant emitted by each group member, once it is organized in IBCs. As this happens, individual operants can be modified and local social contingencies are strengthened.

This set of elements composed by recurrence of IBC's and cumulative effects of interrelated behavior is called a *culturant* (Hunter, 2012). This concept is equivalent to the concept of operant (Glenn, 2008a; 2008b), especially because both

are units of behavior selected by the environment (Hunter, 2012). Therefore, the *culturant* is selected by external cultural consequences that affect the arrangement or array of IBCs and their aggregate product. Recurring IBCs constitute a lineage of interlocking contingencies (Glenn & Malott, 2004) and the concept of metacontingency describes the process by which this lineage is formed and maintained (Hunter, 2012).

An example of metacontingency can be given considering interactions among the professionals of one school. Behaviors emitted by the principal, coordinators and teachers of the institution are controlled by specific norms that refer to principles and competencies to be developed in students' behavioral repertoires through academic activities. IBCs including these professionals' behavior have a relevant outcome: some aggregated products that are included in the pedagogical and political project of the school. Therefore, specific competencies are developed in children and teenagers' behavioral repertoire across different school grades. Simultaneously, cultural consequences, such as external evaluations of media - newspaper, radio, television and internet, are produced by parents' organizations, governmental agencies or national and international magazines on education and select lineages of culturants that persist across time. A distinguished aspect of these relations is that behavioral variability produced through contingencies that form IBCs also has as an important outcome: regular project reviews in that educational institution.

However, cumulative products generated by members of a group are not necessarily related to metacontingencies once three-term contingencies can be functionally independent with no interlocking relations among its elements: occasion, response and consequence (see Goldiamond 1975, 1986; Skinner, 1953). This difference from the definition of metacontingency was considered by Glenn (2004), who proposed the concept of macrocontingency to indicate when there is no direct contingency between the operant emitted by any individual of the group and the observed cumulative social effect. A macrocontingency is a cultural practice which encompasses functionally

independent actions, thus resulting in a cumulative product that has no function of selecting by consequences. Recurrence in behaviors of each individual is maintained by its own direct effects and there is no cultural selection. The more widespread a particular practice is, the greater its cumulative effect. Any intervention that aims at changing a macrocontingency needs to focus on individual contingencies involving some members of the group, which may result in changes in the accumulated social products (Glenn, 2004).

An example of macrocontingency can be given by analyzing childrearing practices and parents' supervision of their children at school. Biglan (1995) argues that the application of some scientific findings can be made inappropriately and some risks can be found when the effects of teaching practices are not systematically analyzed according to empirical evidence. Besides, it is possible that a group of parents have little experience on raising children and may acquire some practices involving risks that will additionally be used in different contexts where children live. Macrocontingencies may be formed once parents participate in independent contingencies, emitting different topographies of responses (e.g. mands, orders) and establishing punishment/coercion contingencies. Some negligence may be observed because parents do not supervise their children's academic performance. Cultural cumulative effects such as having learning disabilities, having difficulties in reading comprehension and written tasks, failing school, having no daily study routine at home and having no motivation related to any activity with academic stimuli are some undesirable complex outcomes to a children group.

A behavior analyst would say that cultural planning should be made from a comprehensive context evaluation during all intervention phases, which means that multiple sources of information (e.g. documents, interviews, questionnaires, observation, psychometric instruments,

descriptive and experimental functional analysis) must be taken into account. Investigating a metacontingency requires molecular analysis that targets individual contingencies, and also molar analysis that targets the metacontingency (Delgado, 2012). The external cultural consequence of the metacontingency will be the main source of control of the behavior of each individual in IBCs. However, if a macrocontingency is observed, interventions will be applied to some individuals' behavior trying to produce modifications in the cumulative product. Some members of the government, media and schools, for example, may plan an intervention involving only some parents. The main goal of these interventions would be to increase future probability of systematic and effective parental supervision of children in school and to create a stronger bond between teachers and parents. Strengthening these new interactions may function as instructions to other individuals that were not the audience targeted by these interventions. By arranging new data about family interactions and spreading them with the help of different media professionals contributions can be made by modeling other parents similar behaviors that are included in a macrocontingency. In Brazil, a Draft Bill No. 189/2012, seeks to ensure that parents monitor their children's activities in school which may help to prevent some social issues of great impact on education. However, other contingencies need to be established in order to have this Draft Bill followed in different families.

When considering macrocontingencies and metacontingencies, the main challenge to behavior analysts is to describe contingencies established in a cultural system and to select those that are more effective in promoting specific behavior changes on a group (Malagodi & Jackson, 1989). The focus is not only on "personal-orbit" or local contingencies of individual "troubles", but also in "cultural issues" in a broad social system¹. A comprehensive world view must be adopted avoiding psychocentrism, which helps

¹ "Troubles" is described as personal matters within an individual's local environment and "issues" ones is described as public matters that occur through the transformation of some social contingencies and social settings into larger sociocultural structures (Mills, 1959).

to maintain the fundamental characteristics of a social-cultural system as a whole (Harris, 1979; Mills, 1959; Skinner, 1971). Behavior analysts seek, therefore, an empirical basis to describe and understand the evolution of cultural practices. They consider each of these practices as the operant behavior of a group of individuals, organized in such a manner that it is possible to identify antecedent conditions and consequences for the group itself. The definition of the elements that constitute the group leads to control variables of a community or to the various contingencies related to cultural practices (Ballesteros, López-López & Gómez, 2003).

The need to develop sensitive measures for a macro-environment analysis and cultural planning should be an important focus of behavior analysts' research. According to Lamal (1991), this analysis primarily has a descriptive rather than an experimental emphasis with the inclusion of ecological models and behavioral technology in future cultural planning. Classification systems for different cultures, some forms of cultural regulation, and statements of civil rights and ethical practices refer to many values transmitted in rules or social conventions about *how to do things*, and even *how things are done in a particular culture* (Hall, 2010). Values are fundamental in any cultural planning, becoming verbal statements that describe certain desirable contingent relations between behavior and consequences (Rakos, 2001; Skinner, 1987).

In the next three sections of this article, non-experimental and experimental contributions to the study of cultural practices based on the concepts of metacontingency and macrocontingency will be presented. Many studies about these concepts were conducted in laboratories and the natural environment, including the analyses of government laws. Basic and applied researches have stimulated the development of new research questions involving variables such as verbal behavior (e.g. verbal statements that include values or additional information on

controlling contingencies) and different forms of organization of groups and generations created in laboratory.

Since the last decade, a group formed by me and my graduate students from the Behavioral Sciences Graduate Program of the Institute of Psychology at the University of Brasilia has been conducting research the selection of cultural practices. Some members of the group focused on the Brazilian Health System and analyzed the Organic Health Law (LOS – from its Portuguese initials *Leis Orgânicas da Saúde*) adopted in the Unified Health System (SUS – from its Portuguese initials *Sistema Unificado de Saúde*) (Martins, 2009), while others focused on studying contingencies and metacontingencies identified in family members' relations (Naves, 2008). Other efforts included research on the transmission of cultural practices and the selection by cultural consequences in laboratory *microsocieties* (Andreozzi, 2009; Baia, 2008; Costa, Nogueira & Vasconcelos, 2012; C. P. V. Nogueira, 2009; E. E. Nogueira, 2010; Silva, 2011). A general discussion of some studies will also be proposed below.

Non-experimental contributions to the study of cultural practices: Contingencies and metacontingencies in the Brazilian Organic Health Laws

The proposal to analyze laws by using the concept of metacontingency was first made by Todorov (1987) and then many studies focused on different Brazilian laws (see Sénéchal-Machado & Todorov, 2008; Todorov, 2005; Todorov & Moreira, 2005). In this recent research area in behavior analysis, the description of metacontingencies in the SUS may contribute to establishing a consistent correspondence between its principles and implementation. It also may suggest how cultural interventions can be planned in order to maintain the citizens' rights to public healthcare in Brazil.

2 Two specific federal laws constitute the LOS: (1) Law No. 8.080, of 09/19/1990, with 55 articles, and (2) Law No. 8.142 of 12/28/1990, with 4 articles (Brazil, 2007).

For over 20 years, SUS has been the largest public policy of social inclusion implemented in Brazil and is currently regulated by the LOS² (Gerschman, 2004; Rodriguez Neto, 2003). SUS assures that public health care is available to more than 70% of the country's population and became a model for agencies concerned with public safety and welfare, as well as for other South American countries. Metacontingencies were identified by Martins (2009) in SUS's management board, which includes planning, organizing, executing, monitoring and evaluating health policies. Many individuals are involved in these activities representing different government levels. Some critical points in the legal texts that indicate laws need special attention: (a) there is not a complete description of three-term contingencies, which means that one of its elements is missing and this can allow for a number of erroneous interpretations once the behavior is not clearly described, (b) abstract statements such as "health is an universal right and a duty of the State" are frequent and do not facilitate their enforcement or the generation of new cultural practices among the individuals who should follow the law (cf. Todorov, 2005), and (c) a balance between ceremonial and technological processes³ is needed to avoid excess of ceremonial control that may prevent important social innovations.

In SUS organization, metacontingencies involve agents from three government levels from central to cities – Federal, State and City government. They constitute the IBCs between the Federal Ministry of Health and the State and City Health Secretaries whose actions result in social products and external cultural consequences, derived from the values expressed in SUS. The IBCs are formed by individuals of three different government levels from federal to local government agencies. Their participation is expected in LOS/SUS in order to describe values that may form different cultural practices

with IBCs, aggregated products and cultural consequences.

Contingencies of reinforcement identified in LOS/SUS specify values according to ethical principles of the Brazilian Constitution of 1998. These values include the importance of popular participation (e.g., media, universities and the clergy); the decentralization of SUS management and supervision; the humanization of health practices (e.g., those aimed at pregnant women, children and the elderly; home care services); national and international cooperation; and rights to access information on public health (Martins, 2009).

Therefore, LOS/SUS interlocking behavior contingencies produce aggregate products such as: (a) standard and public health policies, (b) actions and services of basic, medium and high complexity care, (c) health indicators, and (d) SUS's products and technologies. And the selection of culturants in LOS/SUS metacontingencies is related to some cultural consequences: (a) social evaluation - feedbacks of population that uses SUS services across the country, (b) economic evaluation - SUS's costs and benefits, (c) professional evaluation - health professionals organizations, and (d) external evaluations from other countries that have implemented a similar health public system.

Besides the metacontingencies analyzed by Martins (2009), he also describes some risks in macrocontingencies related to SUS. There are recurrent lawsuits showing that citizens ask for additional pharmaceutical care. These demands may result in significant financial losses for the system. This macrocontingency needs cultural planning in order to guarantee the survival of such a health system. Policies to regulate common goods are also necessary considering the costs and the insufficient funding to include "all drugs available on the market". So, adopting the concepts of metacontingency and macrocontingency in non-experimental studies may contribute to understanding and improving a large variety of

3 These are two types of forces described by Thorstein Veblen (1899/1934). They generally occur simultaneously in the process of cultural development. Ceremonial control is based on the status of who presents a statement proposing some actions or values. Technological control refers to the consequences of those verbal statements.

public services by suggesting variables to manipulate in different organizations. The interlocking behavioral technologies, applied research and basic research have to be maintained in a behavior-analysis approach of culture.

Experimental contributions to the study of cultural practices: The family as a field to study cultural practices

The family is the oldest social institution with enormous power to influence individuals' behavior and often environmental systems as well. Empirical studies have been conducted recently on the evolution of family cultural practices (Mattaini, 1999) and have to consider a scenario which includes changes in parental authority, implementation of divorce, fertility decline associated to less children per family, and increasing longevity resulting in an aging population (Hall, 2010).

All these factors related to families can stimulate studies on cultural practices, and the concept of family adopted in this paper is one from a social work conducted by Mark A. Mattaini:

(...) families are not defined structurally in terms of economics, legal arrangements, or biology. Families include persons in heterosexual or gay, married or cohabiting, single or multigenerational relationships. (...) In an ecobehavioral model, all families have some elements in common. Over time (and often generations), every family develops a "family culture" – a set of interlocking practices that occur at relatively predictable times, or under predictable circumstances. (...) These family cultures, in turn, are related transactionally to environmental events and larger cultural entities to which the family and its members belong (schools, jobs, ethnic and religious groups, neighborhoods). (...) Aversive conditions, events and exchanges with the extra-family environment may have a profound impact on individuals and the family as a whole. (Mattaini, 1999, p. 4).

One of the main goals of Naves (2008) was to describe interactions of family members by

manipulating antecedent stimulus based on two family models – traditional and contemporary. The interactions that occurred during specific tasks given by Naves offered data that allowed her to compare some aspects included in verbal statements about the nuclear and extended family. The study with two Brazilian families was developed as an experimental analogue of four frequent home activities in the family's routine – snack time, homework, playing and room organization. Across different sessions, participants received information about characteristics of a *traditional family* which represented the prevalent model on the first half of the Twentieth Century or of a *contemporary family*. The four activities mentioned were carried out in all sessions, and family members were asked to discuss their family relationships regarding those two family models (traditional and contemporary).

Interactions among the family members who participated in this study were described based on three-term contingencies and behavioral categories (verbal and non-verbal) were defined as an additional strategy to analyze those interactions observed in the laboratory (cf., Sharpe & Koperwas, 1983). A three-term contingency could be identified during snack time, when a child asked her mother to give him juice and talked about things that happened at school that day. His mother gave him some juice and congratulated him on his academic performance. Behavioral categories such as approval, disapproval, description, irony, orientation, response to the request, minimum verbalization, no-interaction, request and problem solving were related to each observed contingency.

The occurrence of interactions between family members, the frequency of each behavioral category and the reports regarding family models were measured (e.g., Bailey & Burch, 2002). Two trained observers recorded the occurrence of interactions from video recordings of the sessions with an average agreement rate of 88% ($SD = 9.74$) and 71.7% ($SD = 2.96$) for the behavioral categories.

Parents' reports about their family histories indicated prevailing authoritarian and punitive practices and also portrayed fathers as being emotionally distant from their family life. However,

some parents made statements suggesting some intention to strengthen child rearing practices based on affection, dialogues, encouragement and recognition of children's achievements. Both families assessed themselves as being more similar to traditional families; the mother takes care of the children and manages household chores, while the father is seen as member committed to providing for the family.

A higher percentage of interactions was observed during snack time between younger children and their parents and during homework between older children their and their parents. Fewer interactions were observed during play time for younger and older children playing together with different objects or games, when there was also little engagement of their father. All family members interacted during the activity that required organizing the room. They usually worked in pairs in order to accomplish this task in a small amount of time. The four activities presented evoked different frequencies of the behavioral categories. For example, *irony* was shown only by children older than 10 years as it requires a learning history of satirizing everyday problems (cf. Hübner, Miguel & Michael, 2005). Likewise, reports of changes in child rearing practices adopted by parents did not show any increase on *approval*. Recurrence of interlocking behavioral contingencies involving interactions among mothers and their children represents a configuration closer to that one called a traditional family model (Naves, 2008).

Therefore, the interlocking behavioral contingencies observed included behaviors of different members from the nuclear (parents and children) and the extended family (other family members such as grandparents) as indicated by their verbal statements. In the dynamic evolution of the family, each new change in the nuclear family and new arrangement of contingencies can include new values. IBCs and aggregate products can be selected by external cultural consequences under control of the members of the extended family and of other systems such as school, healthcare services, judicial agencies, religious institutions and local communities (e.g., condominium, town or district).

It is worth mentioning that both ceremonial and technological contingencies and metacontingencies can also be identified during the evolution of family practices. Recent studies focusing these concepts represent an additional progress in this area of research. When one says there is a ceremonial control of cultural practices it means that social changes in these practices are less probable because of this dogmatic and rigid type of control. Ceremonial contingencies and metacontingencies do not specify the conditions in which behavior is emitted or the consequences of behavior. Well established and respected authorities such as politicians, judges, priests, mothers and fathers may express this type of control through verbal statements (oral and written) that constitute some laws or moral patterns for expected behaviors in a society. When one says there is a technological control of cultural practices it means that they follow rules including complete descriptions of contingencies or of its consequences. However, technological contingencies may become ceremonial when the contingencies do not coadunate with cultural evolution. Finally, ceremonial and technological contingencies cannot be considered necessarily as opposites to any type of so called democratic control of cultural practices (Carrara, 2008; Todorov, 1987).

The culturants of some ceremonial metacontingencies may be composed of cultural practices based on an explicit division of tasks among family members according to gender – homemakers and breadwinners. So, during many decades, aggregate products showed prevalence of political but not numerical patriarchal families (Ribeiro, 2000). The external cultural consequences of these contingencies may be under the control of the members of the extended family. Therefore, in some ceremonial metacontingencies myths may be transmitted and maintained such as “changes in the family structure signals the disintegration of the whole family”. These ceremonial metacontingencies were weakened and substituted by technological metacontingencies after many decades. They changed through the selection of new cultural practices that include economic and demographic factors as external consequences (see a sociological review of family

by Bidwell & Mey, 2000). Other variables can be of interest in the study of metacontingencies and macrocontingencies established in the organization of family relations. Some cultural products that can be investigated are: (a) diversity in the family composition and its different arrangements; (b) households constituted by *communitarian mothers* in shelters; (c) school-family relations; (d) the technology of information and communication-family relations, and (e) the health care services-family relations. All these relations constitute new areas of research that require using documental and observational methods to investigate cultural practices of families and can result in new experimental studies.

Experimental contributions to the study of cultural practices: Transmission of cultural practices in a laboratory setting

Experimental studies on cultural transmission have shown some behavioral patterns of cultural changes; this has been suggested previously by different areas of knowledge such as socio-cultural anthropology, archaeology, sociology and others (Mesoudi & Whiten, 2008). Baia (2008) and C. P. V. Nogueira (2009) have used the replacement method (cf. Mesoudi & Whiten, 2008) as a tool to study the transmission of cultural practices in laboratory settings.

Baia (2008) adapted the procedure created by Baum, Richerson, Efferson and Paciotti (2004) to analyze the effects of different cultural consequences on culturants that were selected within and between generations. Two groups of undergraduate students were organized in 10 generations of 3 members each. Replacement of one group member occurred at the end of a generation which was represented by a session of 30 min. The time of the session was divided into two conditions according to the manipulation of reinforcement magnitude and time-out (TO) contingent on card choice. Choices should be made from an agreement among the three participants and resulted in different consequences (reinforcement or time-out). Optimal choices were defined for each condition. Instructions

informed the players about the card choice based on agreement among all participants; the construction process for a paper airplane; the replacement of a group member; the points that would be earned and distributed by them; and the possibility of having verbal interactions. Each session contained a cycle with a card choice, a distracting task (paper airplane construction) and the distribution of earnings, followed by the replacement of one participant. The results showed that the time used in the distraction task decreased across cycles in both groups and this indicates an increase on micro society efficiency. Transmission and perpetuation of cultural practices that involved preference for alternatives with greater magnitude of reinforcement occurred in both groups. Also, verbal statements regarding the choices indicated that the greater magnitude of reinforcement was chosen and were followed by corresponding changes in the preference curves.

Choices tradition among generations can be analyzed to compare, in absolute terms, the choices for the card with lesser magnitude made by one generation with the choices made by the previous generation, whereas the preference may vary within one single generation. With the criterion of *cumulative tradition*, similar to the *liberal criteria* used by Baum et al. (2004), one point was assigned to a generation when there was only one choice for the card of lesser magnitude. Repetition of this choice revealed the traditions of generations in both groups and both conditions. The announcement of the cards choice by each member of the generation represents the IBCs. When IBCs produced an environmental effect (the consensus card choice), the experimenter applied the cultural consequences (money and TO) which could reiterate or change the IBCs. Thus, Baum's et al. (2004) procedure contributes as an alternative of laboratory research of metacontingencies. Baia's (2008) adaptation of this procedure suggested the transmission of cultural practices in a laboratory setting in an entity which an analogous to a metacontingency. Future replications need to program individual and cultural consequences in order to demonstrate the cultural selection function.

The Commons Dilemma (E.E. Nogueira, 2010; Silva, 2011) and applied mathematics games such as the Prisoner's Dilemma Game (PDG) and its variations have also been used in order to study metacontingencies in the laboratory (Costa et al., 2012; C.P.V. Nogueira, 2009; Ortu, Becker, Woelz & Glenn, 2012).

In the study of C.P.V. Nogueira (2009), based on Costa et al. (2012) and Ortu et al. (2012) procedures, a variation of the PDG was used with three participants. Twelve undergraduate students played a game called the *Game of the Hunter* in which three hunters should decide, in each trial, if they would hunt alone (A) or in group (G). These choices could result in four IBCs involving the three players (GGG, GGA, GAA, AAA) and four aggregated products (the sum of points obtained by each player). Each player received a specific number of points depending on his choice in the combination with the others' choices. The combination GGG and AAA produced equity and GGA and GAA produced inequity of points amongst players. According to previously selected IBCs, a cultural consequence was presented as a "market reaction" (extra points to be shared by the group). Under the baseline condition, no cultural consequence was delivered. In the other four conditions, points from the cultural consequence were obtained only if the choice combination related to that condition occurred. Any other combinations resulted in no cultural consequence and each player earned just his individual points. The cultural consequence, when applied, was the same regardless of the specified combination of choices.

After each choice, players had access to information about the other participants' choices, the points obtained by each player individually and the cultural consequence. Also, the players could either communicate with each other for a brief period available every ten trials (C), or could not communicate at all (NC). Choices could also occur either simultaneously (SM) or sequentially (SQ). This resulted in four other conditions (C-SM; C-SQ; NC-SM; NC-SQ) which were superimposed onto each of the four conditions defined by the combination of choices producing cultural consequence.

Data obtained by C.P.V. Nogueira (2009) showed the selection of specific culturants on each of the main conditions (GGG, GGA, GAA, AAA). When the players could communicate (C-SQ and C-SM), compliance with the stability criterion was increased and was greater in C-SQ than in C-SM. This may have occurred because of mands issued by some players. For example, one player stated: "Let's rotate who gets more points; we should just take turns with the green card". Verbal interaction in the groups were also followed by *agreed choices* (the same choices for all members) and occurred more frequently under the GGG/C-SQ condition. On the other hand, when there was no communication (NC-SM; NC-SQ), different choices were made by the players. It is worth mentioning that *imprisonment* (the consecutive agreed choices for AAA for two or more consecutive times) (cf. Yi & Rachlin, 2004) did not occur in the C conditions, but was present in all NC conditions, although at low rates. These data are consistent with findings from Ortu et al. (2012) and Costa et al. (2012) and shows how the Prisoner's Dilemma Game with the addition of cultural consequences is an appropriate tool for the study of metacontingencies. The selection of IBCs was also observed even with inequity of points obtained by the players, as in GGA and GAA. Besides, during these inequity combinations, players took turns at the different choices so that the final outcome was not much different among them.

Conclusion

The concept of metacontingency proposed by Glenn (2004) and Glenn and Malott (2004) is a useful tool for the research of the selection of cultural practices. This concept as well as the one of macrocontingency can be applied in different contexts by non-experimental and experimental studies which can contribute to a greater database that shows the possibilities of understanding cultural practices, ranging from large and complex societies to microsocieties in a laboratory setting. Non-experimental work can identify metacontingency and macrocontingency relations in the natural environment and so can

help explaining the functioning (efficient or deficient) of social systems, like the health system selected by Martins (2009) in his SUS analysis. Experimental work carried out with laboratory microsocieties allows for controlled manipulation of metacontingencies and macrocontingencies' elements in order to understand which variables may affect the establishment, maintenance and changes of cultural practices. The studies briefly described in this paper (Baia, 2008; Naves, 2008; C.P.V. Nogueira, 2009) and others (e.g., Hunter, 2012; Ortu et al., 2012; Velasco, Benvenuti & Tomanari, 2012; Vichi, Andery & Glenn, 2009) illustrate such contributions. The elements of the concept of metacontingency – IBCs, aggregate products and cultural consequences – have been identified in experimental studies. Selection of culturants by external cultural consequences was observed in variations of the Prisoner's Dilemma Game (Costa et al., 2012; C.P.V Nogueira, 2009; Ortu et al., 2012), Likewise, transmission of cultural practices according to traditions of choices among generations was also observed by Baia's (2008) adaptation of Baum's et al. (2004) procedure. Non-experimental work in the natural environment and experimental work on the laboratory should not be viewed as belonging to different domains of scientific research, but as a cumulative effort to understand cultural practices in the realm of behavior analysis. The findings obtained by such studies may contribute to the selection of cultural practices through their planning and maintenance, as well as the development of new and innovative ones. The ultimate goals of these practices should be the well-being and happiness of all individuals belonging to each society that adopts such practices.

Finally, it should be noted that cultural practices are not an exclusive object of behavior-analytic studies. Other areas of knowledge, within their analytical view, have contributed to the study of culture and cultural practices for many decades. Exchanges among behavior analysis and these other areas have been proposed (e.g., Dittrich, 2008; Glenn, 1988; Leite & Souza, 2012; Lloyd, 1985; Malagodi & Jackson, 1989; Malott, 1988; Sampaio, 2008; Tourinho & Vichi, 2012; Vargas, 1985) as well as exchanged

with other approaches in Psychology. They are certainly an important and necessary analytical expansion to a broader comprehension of the evolution of cultural practices and cultural planning, especially in situations of risk for groups of individuals and for the natural environment (toward harmful impact on sustainability).

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