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TOWARD CONSISTENT TERMINOLOGY IN A BEHAVIORIST APPROACH TO CULTURAL ANALYSIS

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ABSTRACT: This article represents an attempt to reach consensus on terms frequently used by its authors, who share an interest in extending a behaviorist worldview to cultural phenomena. Definitions of *metacontingency, macrobehavior, macrocontingency, culturo-behavioral lineage*, and *cultural cusp* were

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agreed on and are reported in this paper. In addition, the paper presents additional points its authors discussed in arriving at the definitions provided. It is expected that this terminology will continue to be refined with further study and applications.
Keywords: metacontingency; macrobehavior; macrocontingency; cultural cusp; cultural-behavioral lineage; cultural transmission

In April, 2015, a group of 12 behaviorists was convened in São Paul by João Claudio Todorov to resolve differences in terminology used in behavioral publications on cultural-level phenomena. The meeting was held in conjunction with a conference sponsored by the University of São Paulo (Todorov, Benvenuti, Glenn, Malott, Houmanfar, Andery, et al., 2015). Although meeting participants had a broad range of interests—including experimental research, applications to business and other organizations, and applications to large scale social phenomena—they had in common a conviction that the behaviorist world view promulgated by B. F. Skinner could be used and extended to understand and change the cultural phenomena in which the behavior of individuals is embedded.

Todorov's goal in convening the meeting was that participants arrive at a consensus regarding definitions of concepts viewed as important to the work of participants. Of particular interest at the outset were definitions for the concepts of *metacontingency, macrocontingency* and *macrobehavior*. A preliminary point on which there was general agreement was that the concepts planned for discussion were *not* assumed by participants as being the *only* concepts needed in the analysis of cultural phenomena. Rather, they were prioritized because they had been found useful conceptual tools both in guiding experimental analysis (e.g., Costa, Nogueira, & Vasconcelos, 2012; Marques & Tourinho, 2015; Saconatto & Andery, 2013; Smith, Houmanfar, & Louis, 2011; Velasco, Benvenuti, & Tomanari, 2012; Vichi, Andery, & Glenn, 2009) and in understanding and changing everyday cultural-level phenomena (e.g., Houmanfar, Alavosius, Morford, Reimer, & Herbst, 2015; Machado & Todorov, 2008; Malott, 2003; Naves & Vasconcelos, 2008; Sandaker, 2009, 2010; Todorov, 2009, 2013).

Throughout the meeting the group found it necessary to clarify what they meant by terms that appeared in their proposed definitions or to address related issues that arose in the context of their discussions. This wandering of the task, from the initially targeted quasi-technical terms to words used to explicate their meanings, was to be expected because scientific terms not expressed mathematically are expressed in ordinary language, and thus introduce their own confusions. In short, participants found themselves immersed in the kind of thorny philosophy-of-science problems often dealt with at great length by scholars grappling with evolutionary biology's key concepts. As Keller and Lloyd (1992, p. 3) succinctly stated in their introduction to *Keywords in Evolutionary Biology*:

> Although it may not be possible, or even wholly desirable, to achieve a fixed meaning for scientific terms, the effort to 'control and curtail the power of language' remains a significant feature of scientific activity. The very extent to which scientists … aim at a language of fixed and unambiguous meanings constitutes, in itself, one of the most distinctive features of their enterprise. And even though never quite realizable, this effort to control the vicissitudes of language, like the commitment to objectivity, reaps distinctive … benefits.

Despite the vicissitudes of ordinary language and the varying scientific and practical interests of the participants, the group managed to end the two-day session with a product comprising two pages of working "definitions." In the following paragraphs, we report the content of that product and discuss some of the issues the group dealt with in attempting to come to a consensus.

Metacontingency

During its nearly 30-year history, the concept of *metacontingency* had been undergoing more or less continuous development. Given the variations in definition, the group agreed to seek consensus on a definition having the minimum number of terms possible. Without denying that metacontingencies could be expanded to three or more terms (e.g., Houmanfar, Rodrigues, & Ward, 2010), the group agreed that the minimum number of metacontingency terms was two—comparable to response/consequence contingencies first investigated by Skinner (1938). The first term in a metacontingency relation is interlocking behavioral contingencies (IBC) measured by their aggregate product (AP). This term was viewed as analogous to movements of a laboratory animal measured by the switch closure they produced. The second term in a metacontingency relation is the consequences contingent on IBC/AP (analogous to the delivery of food contingent on movements producing switch closure in an operant experiment). The following definition specifies the contingent relation between these two elements.

> ***Metacontingency: A contingent relation between 1) recurring interlocking behavioral contingencies having an aggregate product and 2) selecting environmental events or conditions***.

The contingent relation, then, in a metacontingency is between a culturant (IBC+AP) and its selecting consequences. The IBCs themselves are made up of interlocking contingencies of reinforcement in which the local behavior of participants is directly reinforced. That IBCs can be maintained eventually by culturant consequences (in the absence of direct reinforcement for participant behavior) was demonstrated by Saconatto and Andery (2013), Tadaiesky and Tourinho (2012) and Vichi, Andery and Glenn (2009).

Figure 1 is a schematic of a metacontingency that depicts recurring IBCs in which five people produce an aggregate product. Each person's activity and/or its effects functions as environment in the operant contingencies maintaining the behavior of others. For example, packing depends on the presence of materials to pack, which depends on the conveying behavior of another person, and so on. The orderly arrangement of these interlocking contingencies results in the aggregate product of a shipment of packed items. The IBC/AP unit is identified as a culturant (named by Hunter, 2012) and it is shown as being selected by an external environment in the form of consumers who pay for the shipped items. The contingent relations between the IBC/AP and the selecting environment constitute the metacontingency. (For other examples of this type of metacontingency, see Malott, 2003; Malott & Glenn, 2006).

The example is designed to distinguish as clearly as possible between the *operant* contingencies participating in the IBCs and the *meta*contingencies in which the IBC/AP recurrences function as cohesive wholes (culturants) susceptible to a selecting environment. Important to note is that the selecting environment cannot reasonably be expected to function as reinforcer for the behavior internal to the IBCs in this example. That behavior is maintained by operant contingencies that remain in existence only because they function together as a unit to

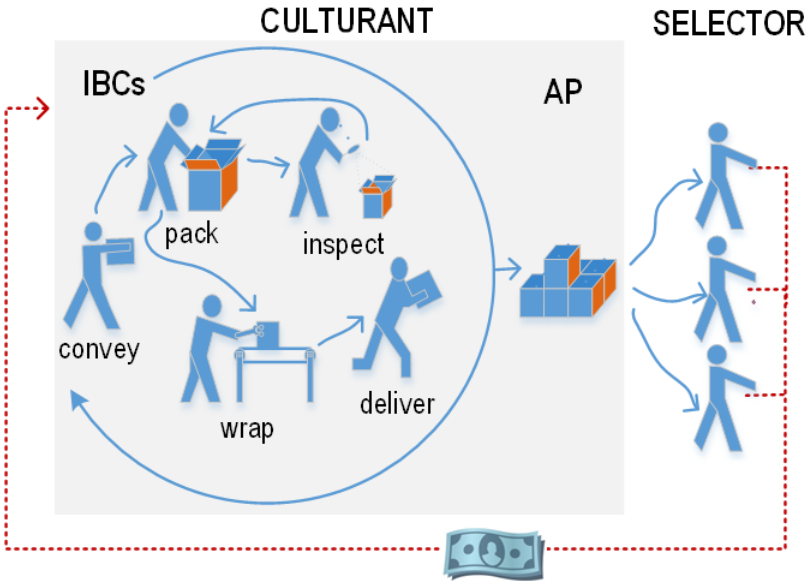


Figure 1. Metacontingency depicting selection of a shipping company culturant by an external selector

generate the product in the metacontingency. Perhaps too obvious to require mention is that most IBCs participating in metacontingencies involve verbal behavior of participants. The verbal behavior of interest in those IBCs is that which supports or undermines a viable aggregate product.

It needs also be noted that the particulars in the example are incidental to the purpose of the example, which is to depict the *kinds* of relations that constitute metacontingencies. That is, the product of IBCs does not have to be objects, and their selection does not require financial transactions. For example, negative political ads produced by IBCs of a campaign staff may be selected by voter choices, and musical products of an amateur band's IBCs may be selected by offers to play at the local pub.

Participants addressed several topics related to the terms in the definition. It was pointed out that the interlocking behavioral contingencies that play a role in metacontingencies are a subset of the more general "interlocking contingencies" that were named by Skinner (1957, p. 432) and that are ubiquitous in human affairs as pointed out by Andery, Micheletto and Sério (2005). Metacontingencies, however, involve only those interlocking contingencies that *recur* in a lineage *because* they have been selected as functional wholes by their environment. The addition of *behavioral* to Skinner's interlocking contingencies serves merely to identify them as operant-level contingencies *in* the IBCs, to be distinguished from metacontingencies that involve relations *between* the IBCs/AP and their selecting environment (Andery & Sério, 2003).

Another point of general interest was that variation among recurrences of IBCs is assumed. IBC variation could be the result of variation in operant recurrences in the behavior of individuals participating in the IBCs, or of replacement of one or more of those individuals, or of alterations in the organization of the interlocking contingencies. Any of these variants might be planned or unplanned. If variations in recurrences result in drifting of IBCs sufficient to alter the aggregate product, selection may be affected—either positively or negatively. Further, culturants may change over time as external environmental consequences (or antecedent conditions) change

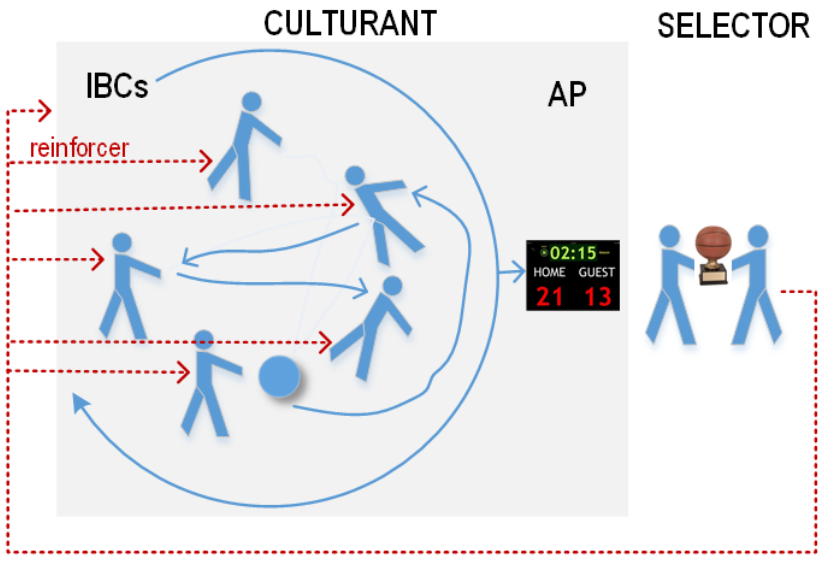
and variants not selected in a given socio-cultural environment may remain available for selection at a later time.

The arrangement depicted in Figure 1 was discussed in light of other possible arrangements that might be considered as metacontingencies. For example, Hunter (2012) discussed an experiment conducted by Azrin and Lindsley (1956) as a metacontingency arrangement. In that experiment, candy to be shared by two children was delivered contingent on interlocking contingencies that produced a particular arrangement of pegs (AP) on a board with holes for the pegs. The candy may be considered as reinforcement for each child's actions and also as selector of the IBCs that produced the required arrangement of pegs. This type of redundancy may characterize many metacontingencies in complex societies. An example is shown in Figure 2.

Figure 2 depicts a high school basketball team's interlocking behavioral contingencies that produce a winning score (AP). Winning scores in a sufficient number of games results in the external delivery of the championship trophy. Implicit in this example, is the likelihood of alternative variations in IBCs resulting in losses of some of the previous games, with resulting alterations in the team's playbook. The championship trophy selects those IBCs (including playbook adjustments) that produced winning games. The awarding of the trophy following the championship game may have the dual function of reinforcer for the plays made by individuals as well as selector of the playbook IBCs that resulted in winning scores.

In a third kind of metacontingency arrangement, the aggregate product itself may have the dual function of reinforcing the behavior of participating people and of selecting the interlocking contingencies that result in the product. In Figure 3, the completed puzzle (AP) requires that each participant's behavior occur in relation to the behavior of the others. Recurrences of their assembling suggest that the aggregate product functions as selector of IBCs, and it also likely functions as reinforcer for the cooperating behavior of the puzzlers.

Figure 2. Selection of basketball game culturant by an external selector with dual functions—operant and culturant



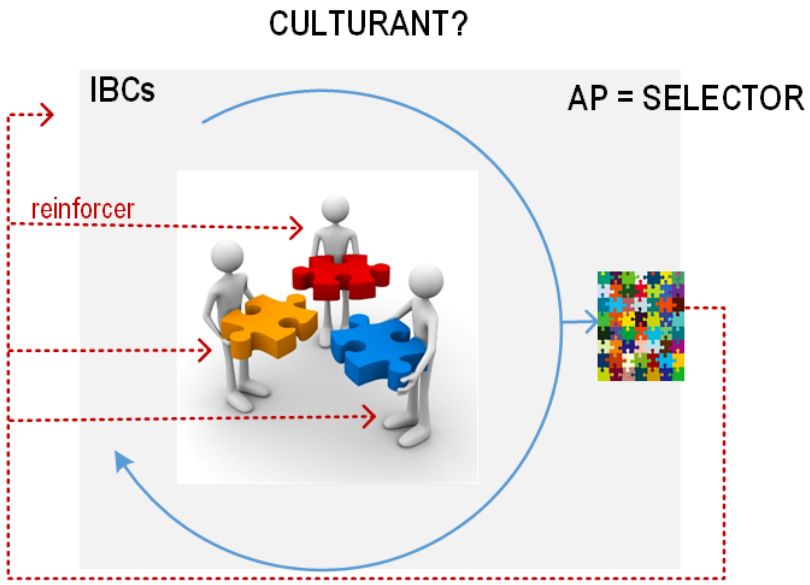


Figure 3. Selections of puzzle assembly by an aggregate product with dual functions—operant and culturant

This type of simple arrangement in which the aggregate product itself has dual functions of operant and cultural selector may typify the historical emergence of recurring IBCs in social environments. Because complex organizations surely did not materialize fully formed, their evolution in historical social environments must have involved some "mixed" arrangements of operant and cultural selection processes. Skinner suggested similar "mixed" arrangements between operant reinforcement and natural selection: "When the selecting consequences [in operant and natural selection] are the same, operant conditioning and natural selection work together redundantly" (Skinner, 1981, p. 501).

Because the operant/culturant distinction can be seen most clearly when the environment that selects IBCs producing a particular product cannot function to reinforce the operant behavior participating in the IBCs, several laboratories have developed preparations that clearly delineate between operant and culturant contingencies, and even pit the two kinds of consequences against one another (Baia, Azevedo, Segantini, Macedo, & Vasconcelos, 2014; Cavalcanti, Leite, & Tourinho, 2014; Ortu, Becker, Woelz, & Glenn, 2012; Pavanelli, Leite, & Tourinho, 2014; Saconatto & Andery, 2013; Toledo, Benvenuti, Sampaio, Marques, Cabral, Araujo, et al., 2015). A review of much of the experimental research on metacontingencies was recently published (Tourinho, 2013).

Culturo-Behavioral Lineage and Cultural Transmission

Most human behavior is acquired as a result of learning from other humans—by observation or via explicit instruction. The behavior of both parties in these learning episodes, usually designated as "social behavior," is the foundational phenomenon of human cultures. The specific behavior acquired by learners depends, of course, on the repertoires of the particular humans whose behaviors (or products) function in the learner's operant contingencies. Norwegian

speakers teach Norwegian speech and Portuguese speakers teach Portuguese speech to new members of their communities. (See Andery, 2011, for review of behavior analytic publications on social behavior/interactions.)

The prototypical relations of cultural transmission are those between behavior of parents and teachers, on the one hand, and children on the other. But children (and adults) also learn from peers, neighbors, religious and lay leaders, books, art, music, and the internet. When a socially acquired behavior is replicated in the repertoire(s) of other individuals, a new type of lineage emerges. It was named a *culturo-behavioral lineage* and suggested as a type of phenomenon that emerged historically in the transition between operant and cultural selection processes (Glenn, 2003).

Culturo-behavioral lineages are "behavioral" because they comprise recurring *behavior*. Although the behavior is operant, the lineage is not. That is because an operant lineage is grounded in the existence of an individual organism. Culturo-behavioral lineages are "cultural" because the lineages extend beyond any specific operant lineage and even beyond the lives of organisms whose behavior contributes to the lineage. The meeting participants defined them as follows:

> ***Culturo-behavioral lineage: The transmission of operant behavior across individual repertoires.***

Behavior transmitted in a culturo-behavioral lineage is of most cultural interest when it is reinforced and becomes established as an operant in new repertoires. Its recurrences are then in a position to serve as antecedents for further transmission to yet other repertoires (providing the supporting physical and social environments are present). In this way each repertoire altered by social learning can function as a node in an evolutionary "bush" of ongoing transmissions.

Although transmission of operant behavior often occurs across individuals in one-to-one interactions, culturo-behavioral lineages are also embedded in the recurring IBCs of organizations. For example, when a retiring volunteer teaches a new volunteer how to carry out a task embedded in an organization's IBCs, it is critical that the socially learned behavior fit well enough into the recurring IBCs to contribute to the aggregate product. In IBCs that continue recurring as their participants change over time, culturo-behavioral lineages are like individual threads extending continuously through the larger pattern of a fabric. The culturo-behavioral threads embedded in recurring IBCs are seen in experiments where participants who replace others in recurring IBCs learn to behave like those they replaced (Borba, Silva, Cabral, Souza, Leite, & Tourinho, 2014; Marques & Tourinho, 2015; Pavanelli, Leite, & Tourinho, 2014; Soares, Cabral, Leite, & Tourinho, 2012).

Macrobehavior

Human societies are characterized by many similarities in the behavior of their constituent populations. These similarities result from similarities in the physical and/or social content of the contingencies supporting the behavior of individuals. The combination of social learning and consistency in particulars of operant contingencies allows observers to distinguish among various "cultures" and "sub-cultures", including those of corporations, churches, extended families, ethnic communities, and entire nations. That which is being depicted has been called *macrobehavior* (Glenn, 2004). Think Tank participants agreed on the following definition of macrobehavior.

Macrobehavior: Socially-learned operant behavior observed in the repertoires of several/many members of a cultural system.

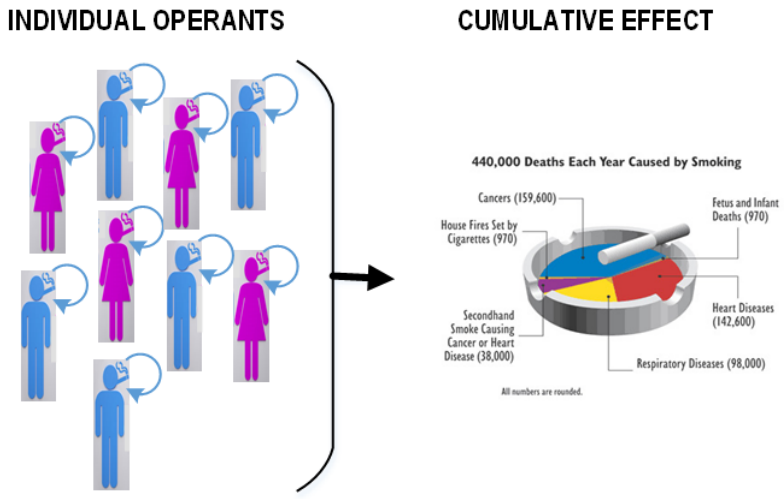
Although the concept of *macrobehavior* may seem somewhat redundant with the concept of a *cultural practice*, the latter term has been defined in many ways, and often includes "beliefs" and "attitudes". The concept of *macrobehavior* is limited to observable operant behavior. It is the subject of much descriptive social science research, where population characteristics are the object of investigation. For present purposes, we will discuss the role of macrobehavior in macrocontingencies.

Macrocontingency

As people go about their daily activities, their behavior is constantly undergoing selection by consequences. For example, cigarette smoking may be reinforced by nicotine consumption, excuse to take a work break, or opportunity to socialize. Another possible outcome is lung cancer or heart disease, but these consequences are both delayed and probabilistic, therefore no match for the immediacy and certainty of the abatement of nicotine withdrawal or the no-work period. Even more poorly correlated with smoking by an individual is the cost of smoking to society. This is because the contribution of any one smoker to that cost is negligible, but the cumulative effect of the macrobehavior of smoking can be huge. The relation between the macrobehavior of smoking and its cumulative effect on disease in the United States is depicted in Figure 4. These diseases, in turn, contribute to health care costs and air pollution, which may be considered additional effects of the macrobehavior of smoking.

People behaving individually are not, of course, the only contributors to health care costs and air pollution. Organizations of many different kinds also contribute to those effects. As in the case of individual behavior, the IBCs/AP that contribute to air pollution, for example, are selected for other attributes. The contribution to air pollution is a side effect of the metacontin-

Figure 4. Deaths as a cumulative effect of smoking of many people under individual operant contingencies



gencies maintaining the IBCs. Figure 5 shows cumulative effects resulting from the combined effects of individual behavior and IBCs of organizations.

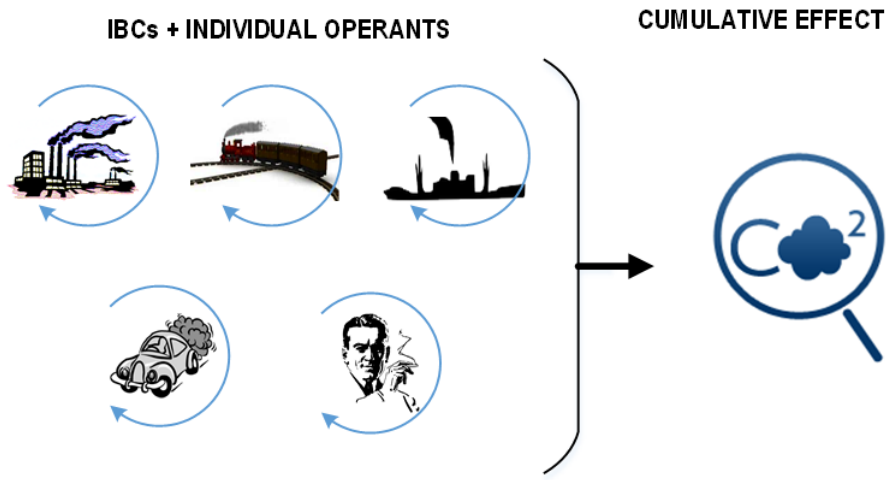
Societal "problems", then, may often be the negative cumulative side effects of behavior selected for other properties at individual and organizational levels. Thus, participants agreed on the following working definition for *macrocontingency.*[2]

> ***Macrocontingency – Relation between 1) operant behavior governed by individual contingencies and/or IBCs governed by metacontingencies and 2) a cumulative effect of social significance.***

Societal attempts to alter behavior of many individuals having undesired cumulative effects often involve imposition of costs on the operant behavior contributing to those effects. For example, increasing taxes on cigarettes is reported to decrease the macrobehavior of smoking (Chaloupka, Stralf, & Leon, 2010; Hu & Mao, 2002). Further, decreases in macrobehavior of smoking have been associated with reduced per capita health care expenditures (Lightwood, Dinno, & Glantz, 2008). In this case, contingent response cost for behavior of many individuals results in positive cumulative effects at the societal level (and presumably prevention of health problems for many people at the individual level.)

As in the case of altering individual behavior, it is also possible to alter macrobehavior to produce positive cumulative effect (or reduce negative cumulative effect) in less aversive ways. For example, guests at hotel buffets who use smaller plates choose foods more carefully. Their

Figure 5. CO_2 as a cumulative effect of independent culturants and operants



[2] Jerome Ulman (2006) has used the term macrocontingency in a way that includes some of the features of metacontingencies, some of the features of what we call here macrocontingencies, and some of the features of what we will discuss later as a cultural cusp. Examples of macrocontingencies he offered included the four-term contingencies involved in a verbal episode involving two people ("a minimal macrocontingency," p. 99), the (evolving) English language, a two-week march of landless workers in Brazil, the Movement of Landless Workers in Brazil as well as the Police Department of Brasilia. What the present analysis has in common with Ulman's is that observable events at the cultural level are the focus of analysis.

aggregate choices result in less waste, with obvious benefits to the environment (Kallbekken & Saelen, 2013). Similarly, placing healthy food items within easy reach and requiring a stretch to reach less healthy alternatives can improve food choices in school cafeterias (Hanks, Just, Smith, & Wansink, 2012) with the cumulative effect of better public health.

Participants agreed that the term macrocontingency, as defined here, is problematic for several reason. First, the cumulative effect in a macrocontingency is not actually in a *contingent* relation with the practices (individual or organizational). That is, the cumulative effect automatically results from the practices and is not independently manipulable. This problem is analogous to scratching an itch at the operant level, and thus could be rationalized as not posing a conceptual problem.

A problem less easily dispensed with is that the effect of the scratching behavior (reducing the itch) appears to have an automatic selective function; but the cumulative effect of the individual and organizational practices of a macrocontingency has no such automatic selective function. This is for two reasons. First, even if altering the cumulative effect could function as a reinforcer for personal behavior, or a cultural selector for organizational IBCs, no individual human or organization alone can significantly alter a cumulative effect. Second, and more important, is that the sources of the cumulative effect are unrelated individual behaviors and IBCs of unrelated organizations. So they cannot function as a unit that can undergo selection. Rather, the many recurring behaviors contributing to the cumulative effect are individually selected and/or the IBCs of many different organizations contributing to the cumulative effect are selected each by their own consequences. In a macrocontingency, then, the selection contingencies are all *within* the first term in the macrocontingency relation, and not in the relation *between* the terms in the definition. Experimental analysis of culturo-behavioral lineages in macrocontingencies was reported by Borba, Tourinho & Glenn (2014).

To alter behavior participating in macrocontingencies it is necessary to establish a connection between the individual behavior and its effect, or else it is necessary to interlock both terms (Sampaio & Andery, 2010). This is frequently done in our societies through verbal contingencies. Campaigns to "educate" or "raise awareness" of individuals in a population can work if they succeed in establishing a "link" between behavior and its cumulative effect and result in new, positive or negative, social consequences for individual behavior. Verbal descriptions of such "links" can also participate as a controlling variable over the desirable behavior. The recently observed decrease in smoking of entire populations is partially explained by such changes: the frequently announced links between smoking and disease, smoking and pollution, smoking and social cost has allowed the emergence of social frowning upon the actual smoking behavior and also for the many forms of self-control developed by smokers who quit.

Cultural Cusp

As mentioned earlier, not all interlocking behavioral contingencies function as cohesive wholes with recurring aggregate products that meet (or fail to meet) selection criteria of their environment. Interlocking contingencies are, in fact, ubiquitous in human societies, evident in the thousands of daily interactions among people who will never see each other again. Other interlocking contingencies may recur but still not constitute cohesive wholes selected by an environment external to any reinforcers embedded in the interlocking contingencies. Examples of the latter are seen in regularly occurring interlocking contingencies shared by shoppers and a

cashier at a grocery store, or by a desk employee and members of a gym, or by repetitions of a bedtime story told to a child by her father.

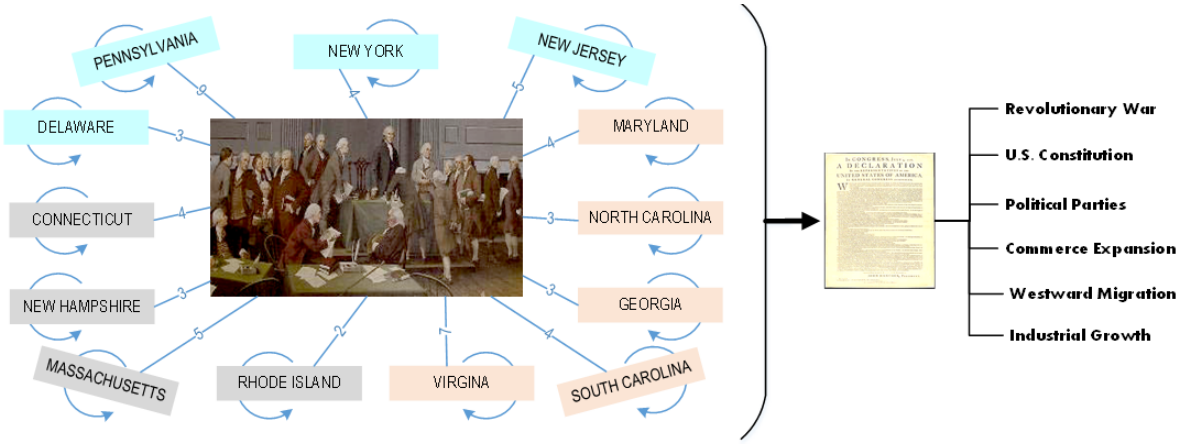
Most of these unique or recurring interlocking contingencies simply represent the warp and woof of societies. Sometimes, however, they coalesce uniquely in such a way as to produce an aggregate product that results in massive alterations of the behavior and maintaining contingencies constituting the fabric of a sociocultural system. Participants in the meeting suggested identifying such coalescence of interlocking contingencies as a *cultural cusp* and agreed on the following definition

> ***Cultural cusp: The coalescence of unique and nonrecurring interlocking and/or individual behavioral contingencies that results in a product that leads to significant sociocultural change.***

An example of a cultural cusp is depicted in Figure 6. The Declaration of Independence was the aggregate product of a Continental Congress, whose members were appointed by the governments of 13 British colonies on the east coast of what is now the United States. The appointments are shown in the figure as the products of recurring IBCs within each colony. These representatives debated extensively, offering a variety of reasons for remaining loyal to or declaring independence from Britain. Eventually, a draft of the Declaration was written by Thomas Jefferson and edited by the drafting committee. Its adoption was far from certain and extensive debate resulted in further changes to satisfy representatives of the slave states. The coalescence of all of these novel operants and IBCs resulted in a document signed, not without anguish and trepidation, by a majority of each colony's representatives. The distribution of copies of the Declaration throughout the American colonies led to a host of immediate and long term changes in operant contingencies and metacontingencies of American society.

Some of the lasting cultural changes emanating from the Declaration are shown in the figure, and include the long war for independence; acquisition of western lands via the Treaty that ended the war, and increased pace in westward migration; the U.S. Constitution (which itself

Figure 6. The Declaration of Independence as a cultural cusp resulting from the coalescence of a novel IBCs



contained language that led in time to the U.S. Civil War); industrial growth and expanded commerce; resettlement of Indian tribes (usually without their consent) in the west, and the emergence of political parties. All of these outcomes represented massive changes in the operant and cultural contingencies for people in the new confederation. (See Wood, 1992 for description of social and economic changes attendant to American independence.) Not represented in the figure are changes in other parts of the world that the Declaration likely contributed to (e.g., French Revolution, constitutional governments in European and South American countries, etc.).

The Declaration of Independence is viewed here as a product of uniquely occurring interlocking contingencies and as a catalyst for resulting socially significant changes. A cultural cusp, then, is defined by its origin in unique and non-recurring interlocking contingencies, an ensuing result or product, and socially significant cultural changes that emanate from that product. Other uniquely occurring contingencies and metacontingencies that appear to have resulted in massive cultural changes have been described by Malott (2015); and her interest in this type of cultural phenomenon was what generated discussion that led to a name for it.

Distinctions of Process, Content and Procedure

One of the most vexing problems in process sciences is the conceptual interplay between the content-free terms of scientific principles or laws and the empirical content constituting the phenomena to be investigated, explained or changed. David Hull (1975) has addressed this problem in the philosophy of biology and it has also been discussed in behavior analysis (Glenn & Malagodi, 1991; Lee, 1988). In this section, our goal is to distinguish between *process* and *content* in behavioral and cultural selection and to consider the role of *procedures* as actions of scientists and practitioners that link content to process.

We begin by pointing out that none of the italicized definitions in the above sections specifies empirical particulars. The terms in the definitions refer to spatiotemporally unrestricted classes that play a role in lawful processes that apply to a great range of particulars. On the other hand, the figures, as well as other examples offered in the text, specify particulars that exemplify the kinds of phenomena involved in the processes. Participants discussed these distinctions as they apply to both operant contingencies and metacontingencies.

Process, Content and Procedure in Operant Contingencies

In a prototypical operant experiment, a rat presses a lever and food is delivered contingent on some feature of the pressing (e.g., one or more switch closures, or time between switch closures). The experiment is not, of course, "about" rats, lever presses, switch closures or food deliveries; these are simply the particulars the experimenter arranges. They are the *empirical content* the experimenter has chosen in order to learn about something else. The 'something else' is the *process* of operant conditioning. Although a resulting change in our rat's behavior may provide evidence that operant conditioning has occurred, the conditioning *process* itself must be described in generic (content-free) terms, not by the particulars of empirical content.

Thus the process of operant conditioning can be described as *change over time in operants as a function of response/consequence contingencie*s. Note that the terms that describe the process are content-free and spatiotemporally unrestricted, as they must be for the process to be considered "lawful" (Hull 1977/1989). The more particulars a process accounts for, the greater the generality of the principle describing the process. For this reason, basic research in any field is almost always conducted with an eye to discovering processes that account for the broadest

range of empirical content. Having available some principles that describe fundamental processes, such as operant conditioning or natural selection, researchers can explore the limits of those principles as well as extend their domain.

For real-world interventionists the specifics of behavioral *content* are vitally important. After all, their goals are to alter the observable particulars causing problems: Johnny can't read; Samantha's head banging is injurious; children with autism do not display joint attention. Knowing something about the specific behavior/environment relations that constitute reading or joint attention is critical. Knowing the particulars of the environment that maintain Samantha's head banging or the particulars of Johnny's current repertoire is also important. But the world is very large, comprising innumerable particulars, so how does the interventionist know where to start? This is where knowledge of process becomes critical. The better the interventionist understands operant conditioning and other behavioral processes, the more likely the interventionist is to identify the critical content and alter specific events to reach a desirable outcome.

But knowledge of how operant conditioning works and of the particular content important to the problem at hand is still not enough for solving the problems faced by interventionists. The interventionist must *do* something, which brings us to *procedure*.

Procedure constitutes the operations conducted by both basic researchers and interventionists in accomplishing their goals. In behavior analysis, procedures involve manipulation of the environment in relation to behavior. The basic researcher manipulates the particulars of contingencies to understand behavioral processes. Thus, content is always present in experimental research but it remains in the background—a means to an end. Conversely, the interventionist manipulates the particulars of contingencies to bring about a particular change in behavioral content. The content is front and center for interventionists while process is a means to the end. Thus process and content are the yin and yang in the circle of science.[3]

Process, Content and Procedure in Metacontingencies

Having discussed these terms with respect to operant contingencies, participants next turned to analogous usage in the analysis of metacontingencies. Several laboratories conducting metacontingency experiments had developed procedures designed to systematically manipulate relations between IBCs having specified AP and an independent variable contingent on IBCs having that AP. In some cases, the experiments manipulated *operant* contingencies *within* the IBCs as well as the *meta*contingencies *between* the IBCs/AP and their external environment. The behaviors involved in the various preparations differed as did the nature of the consequences in the metacontingencies. To the extent that these experiments demonstrated selection of IBCs/AP by external consequences, they exemplified a cultural process analogous to the process of operant conditioning. To the extent that the experiments empirically distinguished between operant selection (for behavior *within* IBCs) and culturant selection (for IBCs/AP), those experiments demonstrated concurrent and sometimes conflicting selection processes at behavioral and cultural levels.

[3] Applied research often combines the interests of basic researchers and interventionists. Although it typically begins by identifying a particular problem, experimental analyses are sometimes conducted to better understand processes contributing to the problem.

That the content of IBCs and consequences in the above mentioned experiments differed from laboratory to laboratory and from experiment to experiment is not relevant to the nature of the processes under investigation any more than it is in operant experiments. However, and also as in the case of operant contingencies, the content becomes the focus of investigation in applied work. A case in point pertains to the 7-Step Disaster Reduction Plan formulated at the 3rd World Conference on Disaster Risk Reduction (Vasconcelos, 2015). The project is overseen by a committee of delegates from 188 countries, the UN's Office of Disaster Reduction and the UN's Scientific and Advisory Group. A complete analysis of metacontingencies, macrocontingencies and operant contingencies involved in this vast undertaking is well beyond the scope of this paper, so we will focus on one item in one of the project's targets.

The first-stated global target is to *reduce disaster mortality* between 2020 and 2030 compared to the period between 2005 and 2015. For our purposes, we will consider the kind of metacontingencies likely involved in obtaining the annual data needed to assess global progress in achieving this target. Those data are the aggregate products of recurring IBCs of various organizations around the world and the value of each organization's data is directly related to the adequacy of the IBCs in generating those products. Perhaps it is obvious that the body making use of the collected data will benefit from specifying what is (and is not) to be included in the data contributing to the aggregate product. That is, what counts as "mortality resulting from a disaster"? For example, should a heart attack occurring during an earthquake be counted? Should starvation of people who were starving before a tsunami occurred be counted? The reliability and validity of the global data will depend on the aggregate products of the data-collecting agencies representing the same types of empirical events.

Although it would be possible to drill down even further in analysis of metacontingencies involved in global disaster risk reduction, we will instead consider what could happen to the aggregate products of the independently operating organizations involved in data collection. In brief, they become the inputs to another organization (perhaps a committee tasked to collect global data for the project). The IBCs of that organization produce the annual reports used to determine whether the targeted reduction in disaster mortality has been met. Thus, the project itself is a pyramid of IBCs … a system in which lower level elements (lower meaning closer to empirical events being measured) generate products (data) that contribute to the performance of higher level elements (committees who make use of the data in recurring IBCs of their own). Similar pyramids of IBC lineages would be involved in other elements of the program, for example those dedicated to prevention, mitigation, preparedness, response, recovery and rehabilitation.

Returning to the distinction between cultural process and content, the foregoing is a conceptual analysis of cultural level phenomena roughly akin to the analysis of "self-control" offered by Rachlin (2000). Although the experimental basis for Rachlin's analysis is far greater than in the present case, the global importance of reducing disaster mortality would seem to make it worthwhile to point to the specific content that must be considered in meeting the goals of a huge organization. Such contingency analyses as offered by Vasconcelos (2015) offer interventionists a road map of sorts in identifying real world events likely to be playing a role in behavioral and cultural processes.

Conclusion

Given the varying histories of the meeting participants, as well as their different interests with respect to relations between behavioral and cultural level phenomena, the culmination of the meeting in a document spelling out definitions of terms was a happy result. As the goal of the convener of the meeting was to establish a common understanding among participants as to definitions of key terms, it is hoped that those spelled out herein will be useful in that regard.

Because scientific concepts are subject to revision over time as they garner more attention and scrutiny, the authors expect to see continuing refinement and utility of the concepts discussed herein. We hope that behavior analysts interested in integrating principles of operant and cultural selection will take up the challenge of improving upon this and previous work directed toward a functional approach to the analysis of cultural level phenomena.

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