

WHAT IS THE METACONTINGENCY? DECONSTRUCTING CLAIMS OF EMERGENCE AND CULTURAL-LEVEL SELECTION

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ABSTRACT: Skinner (1981) proposed that selection by consequences, such as is represented by natural selection on a biological level and operant selection on the level of individual behaviors, plays a significant role in the change dynamics and adaptation of systems in the physical world. He suggested that there might be a third level of selection by consequences—cultural-level selection—that might complement the other two selection processes he explicated. The metacontingency was proposed as a process that might describe such a cultural-level of selection. In the present article, two competing definitions (a three-term definition and a five-term definition) of the metacontingency are compared and contrasted, and several criticisms of the metacontingency are considered. Proponents of the metacontingency have argued that it is an emergent process, possessing characteristics that differ substantively from phenomena at lower-levels of analysis, while critics of the metacontingency have argued that there are more parsimonious theories that account for everything that the metacontingency is intended to address. Theorists have claimed four particular areas of emergence for the metacontingency, each of which is examined through comparison of metacontingent selection with a similar, albeit behavioral-level phenomenon—the production of a complex product via a chain of behaviors performed by a single individual—concluding that the claims of emergence do not appear to be substantiated.

KEYWORDS: metacontingency, emergence, cultural-level selection

The adaptive processes defined by numerous scientific theories prominently feature selection by consequences, perhaps beginning with the definition of the process of natural selection by Charles Darwin (1859). The field of behavior analysis has adopted this perspective, applying it to the level of individual behavior. The three-term contingency comprised of relations between antecedents, behaviors and consequences summarizes the core description of the relationship between behavior and its consequences and is summarized as “Behavior is a function of its consequences” (Glenn, 2004, p. 134). Skinner (1981) believed that selection by consequences was a robust phenomenon that was applicable across various levels of analysis. He proposed that natural selection and operant selection might be joined by a cultural-level of selection in a comprehensive description of the dynamics of change observed in the world around us.

Skinner differentiated between the evolution of cultural practices and what he referred to on multiple occasions as a “third kind of selection” (1953, p. 430; 1981, p. 502)—the evolution of social environments, or cultures. According to Mattaini (2004), Skinner was not always clear in

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his attempts to differentiate between the evolution of cultural practices which occur at the behavioral level and the evolution of cultures which occurs at a higher level of analysis. Skinner (1989) outlined several means through the evolution of cultural practices may occur and through which individuals in a group share these cultural practices among themselves. These means included modeling, imitation, and verbal behavior (for example, instruction and rules). Members of a group typically reinforce these practices, especially in the case of behaviors that have infrequently occurring or delayed primary consequences, via social reinforcement.

In contrast, cultures evolve as practices that are selected by a group via operant contingencies “contribute to the success of the practicing group in solving its problems.” (Skinner, 1981, p. 502), resulting in the survival of the group and its culture over time (Skinner, 1989). The link between particular cultural practices and the survival of a culture over time is an incidental link in Skinner’s conceptualization. He even went so far as to say that any such link may be “wholly accidental” (Skinner, 1953, p. 430). Mattaini (2006) asserted that Skinner’s conceptualization of cultural selection created a number of conceptual problems saying:

The definition of the “success of the practicing group” is a conceptual problem here, as is the selective mechanism—some sort of “group reinforcement” rather than reinforcement of the behavior of the members of the group, perhaps? We currently know nothing about such a mechanism, and claiming that it is “emergent” without being able to even describe—much less explain—it in observable terms does not seem very useful” (p. 70).

Beginning with the work of Sigrid Glenn (1988; 2004), several have tried to propose a selective process that might adequately define Skinner’s “third kind of selection”—selection at the cultural-level. Her efforts culminated in a three-term process of cultural selection that she called a metacontingency (Glenn, 2004; Glenn & Malott, 2004a). Chains of sequential behaviors and behavioral outcomes that serve as either consequences or antecedents for other behaviors in the chain replace individual behaviors in the metacontingency, forming what Glenn called *interlocking behavioral contingencies* (IBCs; Glenn, 2004), the first term in the three-term metacontingency. In some cases, an IBC may produce an *aggregate product* (the second term in the three-term metacontingency) that may be selected by an external *receiving system* (the third term in the three-term metacontingency; see Glenn & Malott, 2004a), providing consequences to the IBC that influence its recurrence. These cultural-level consequences are analogous to consequences that follow an operant response and can serve to either strengthen or weaken the probability that a given IBC will recur in the future. This metacontingent selection process forms part of the basis for cultural adaptation.

At present, there are two distinct models of the metacontingency—a three-term model (Glenn & Malott, 2004a) and an expanded, five-term model (Houmanfar, Rodrigues, & Ward, 2010)—that share several core similarities. The authors of both models have asserted that this metacontingent process of selection operates both above and across the individual-level of operant contingencies (hence the name *metacontingency*) and stands apart from this level of selection due to emergent properties that will be defined and considered in the present paper. Critics of the metacontingency have countered with arguments that, despite the claims of metacontingency theorists, the phenomena for which the metacontingency is purported to account have already been accounted for via more parsimonious theories (Marr, 2006; Mattaini, 2004, 2006). This particular criticism has led several critics to conclude that, while the metacontingency may describe a given process that is a subset of a larger class of behavioral phenomena, it falls short of achieving

its stated purpose to describe a new, cultural-level of selection by consequences (e.g., see, Todorov, 2013). In this paper, I will first consider the two models of the metacontingency, outlining their similarities and distinctions. Next, I will describe and evaluate the criticisms of the metacontingency as a process of cultural selection, supporting Todorov's (2013) conclusion as articulated above regarding the metacontingency.

Two Views on the Metacontingency

The work of Glenn and her colleagues to define this process of metacontingent selection culminated in the three-term metacontingency model that has been briefly outlined thus far in the present article (Glenn & Malott, 2004a). This is not the only model of the metacontingency that has been proposed, and the present discussion will be expanded to include a second definition proposed by Houmanfar and colleagues (Houmanfar & Rodrigues, 2006; Houmanfar et al. 2010; Smith, Houmanfar, and Louis, 2011). They developed their model as a refinement to Glenn and Malott's (2004a) model based on perceived issues with the cultural selection of metacontingencies as proposed by Glenn and Malott that will be detailed in the next several paragraphs. They expanded their definition of a metacontingency to include five terms (Houmanfar et al. 2010; Smith et al. 2011).

The first perceived issue that Houmanfar and colleagues (Houmanfar & Rodrigues, 2006; Houmanfar et al. 2010; Smith, Houmanfar, and Louis, 2011) addressed was focused on maintaining a distinction between the psychological and sociological levels of analysis. Houmanfar et al. pointed out that the term "cultural" is often used to refer to phenomena occurring at multiple levels of analysis. For example, Glenn (2004) differentiated between cultural practices which are selected at the behavioral level of analysis via operant contingencies, and IBCs which are cultural units that are selected at a group level via metacontingencies. To maintain clarity between levels of analysis, Houmanfar and colleagues recommended the adoption of the term *psychological* for behavioral-level phenomena and *sociological* for group-level phenomena based on arguments presented by Kantor (1982) and Parrott (1983).

For Kantor (1982), psychological phenomenon pertained to the functional relationships between specific responses of a person to stimulus objects of many types (including other people). This stimulus-response pair existed in an interdependent relationship that he termed a *psychological field*. Sociological phenomenon, in contrast, have to do with "mere aggregations of individuals" (p. 11) and "the behavior of aggregations and congregations such as mobs, throngs, herds, crowds, races, committees, boards, armies, etc., such data form no part of the psychological domain." (p. 11) Similarly, Parrott (1983) defined psychology as the study of individual behavior, and specifically the functional relationships between stimulus and a response in a *psychological event field*. She further distinguished between *instances* of social behavior (the response of one individual to a stimulus presented by another person), *episodes* of social behavior "in which instances of social behavior alternate between two persons and are arranged in sequence" (p. 539), and *sociological phenomenon* in which "events of interest constitute the joint performance of two persons, conceptualized as a unitary phenomenon" (p. 539). According to Houmanfar et al., psychological data is characterized by "who" is involved, while sociological data statistically mask the associated personal and behavioral features and is instead characterized by "how many" people are involved without regard to "who" (p. 55).

Within the metacontingency, Houmanfar and Rodrigues (2006) asserted that the usage of the term "interlocking *behavioral* contingencies" in the three-term model placed the metacontingency

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at an inappropriate level of analysis since the consideration of the behavioral contingencies involved led to a potential confusion in the level of analysis. They wrote, “IBC’s are nevertheless contingencies for individual behaviors (Sandaker, 2004) and therefore seem out of place when explicitly included in a group or cultural level of analysis” (pp. 16-17). Next, they asserted that the contingent relationship between a given behavior and its consequences is a description of the behavioral selection process and, as such, is not able to itself be selected. Houmanfar, Rodrigues, and Ward (2010) emphasized this further saying, “The sociological characteristics of IBC’s require an analysis of whole groups, which is a fundamentally different type of analysis than those that target individual behavior (i.e., substantive emergence)” (p. 60). In the place of IBC’s, they recommended that the term *interlocked behaviors* (IBs) be adopted since it is the behaviors (not the contingency) that are selected at the behavioral level. To represent the appropriate, sociological, level of analysis for cultural selection where the individual-level behaviors are aggregated and the interlocked behaviors are considered as a whole (such as occurs in the metacontingency), they proposed another term, *socio-interlocked behaviors* (socio-IBs).

The second perceived issue that Houmanfar and Rodrigues (2006) addressed, and Houmanfar, Rodrigues, and Ward (2010) expanded was a lack of correspondence between the metacontingency proposed by Glenn (2004) and the three-term behavioral contingency consisting of the antecedents that precede the behavior, the behavior itself, and the consequences that follow the behavior. To remedy this and promote a more analogous process, Houmanfar and colleagues suggested the addition of a term for the aggregated cultural and organizational context within which the subsequent activities in a metacontingency will occur; they called this the *cultural-organizational milieu*. They intended for this term to parallel the antecedents that precede a response in the three-term contingency of operant selection, noting that Glenn and Malott (2004a) had not included such a term in the three-term metacontingency.

These changes culminated in their proposal of a five-term, expanded conceptualization of the metacontingency, beginning with the cultural-organizational milieu (the first term), followed by a socio-IB (the second term) that produces an *aggregate product* (the third term and synonymous with the same term in the three-term definition) that is selected by *consumer practices* (the fourth term, replacing the term “receiving system” in the three-term definition). This external selection process gives rise to a set of contingencies stemming from these interactions that extend into the larger environment and community and that are more indirect-acting than the typical contingencies operating in other forms of interlocked behaviors (Houmanfar et al. 2010, Figure 2, p. 64). Like the first term, the final term in the five-term definition also has no direct parallel in the three-term metacontingency. This term is *group-rules*, which are formulated by members of the organization of which the socio-IB is part and communicated throughout the organization.

Similarities and Differences between the Two Metacontingency Models

Both metacontingency models describe similar linkages connecting individual behaviors governed by operant contingencies to the cultural/sociological-level contingencies maintained by metacontingent selection, but also have some differences that have the potential to be of significance. As noted above, the two models first differ with the introduction of a new first term by the five-term model—cultural-organizational milieu. While the three-term model of Glenn (2004) does not explicitly mention such a cultural-level parallel to the behavioral-level antecedents, Glenn (2010) acknowledged that, while her definition of the metacontingency did not include any representation of the environmental events or conditions that might serve as

antecedents to IBCs, she was “not suggesting that environmental events or conditions that can be construed as “antecedents” are irrelevant to recurrences of IBCs” (p. 81).

Both models agree that individual behaviors are governed by consequences in a manner described by the operant contingency model. Both models seem to also essentially agree on the relationships presented in the middle-three terms of the five-term metacontingency (which are also the core relationships that constitute the three-term metacontingency), although there are some semantic distinctions. For example, both models agree that, in ubiquitous cases, the behavior(s) of one individual or outcome(s) may serve as either the antecedents or consequences for the behaviors of other individuals, forming chains of sequential and interrelated behaviors.

As was mentioned above, the five-term extension of the metacontingency prefers the term *interlocked behaviors* to describe such chains given that it is the individual behaviors that are selected at the behavioral level (Houmanfar & Rodrigues, 2006). Houmanfar et al. introduced the term *socio-IBs* to clarify that—when we adopt the higher, sociological level of analysis—it is the “integrated whole” of the interlocked behaviors that represents the “appropriate and substantively different unit of analysis at this higher level” (p. 61). Glenn (2010) responded by reiterating her preference for the use of IBCs as the appropriate term, distinguishing between “quasi-individual” behaviors of groups—such as the cheering of a crowd in response to a play in a ball game—and the coordinated behaviors of the team carrying out the play. In the former situation, the group behavior is spatiotemporally located and can be measured as a cumulative product (volume of the cheering, how many are cheering, etc...). Additionally, the behavior is interlocked in that it is linked to a particular event in the game, hence it might meet the definition of a socio-IB. In the latter situation, the interlocked behaviors are linked via a coordinated chain of behavioral contingencies, not just a collective response to a common stimulus. While both situations may be characterized as either group behavior, or alternatively as interlocked behaviors, Glenn argued that the use of IBCs avoided this potential source of confusion. It is only in the case of the chain of behaviors linked via IBCs that selection can occur at the cultural level via the differential selection of the aggregate product by an external receiving system.

Both metacontingency models agree that some of these chains of sequential behaviors may produce aggregate products that are greater than the outcome(s) produced by any of the individual behaviors in the chain of behaviors governed by the IBCs. Incidentally, the authors of both models agree that aggregate products may also be produced by processes other than chains of interlocked behaviors described by interlocking behavioral contingencies, a point to which we will later return (see Malott & Glenn, 2006; see also Houmanfar & Rodrigues, 2006).

The models differ in the terms used to identify the environment external to the system that produces the aggregate product; the three-term model refers to a receiving system(s), while the five-term model refers to consumer practices. In their discussion of the metacontingency, Houmanfar and Rodrigues (2006) accepted *receiving system* as an appropriate term for the entity that differentially accepted the aggregate product, but subsequently replaced this term with *consumer practices* on the grounds that the latter term was less abstract than receiving system and “more amenable to a behavioral account” (Houmanfar et al., 2010, p. 65). However, both models agree that, when aggregate products are differentially selected by an environment external to the organization, this selection results in new, indirect-acting consequences that may be relevant as reinforcing or punishing consequences. Such consequences are delayed in relation to and independent of the direct-acting operant contingencies influencing the individual behaviors in the chain of interlocked behaviors that produced the aggregate product, but may nonetheless lead to

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the recurrence of the chain of behaviors (see Glenn & Malott, 2004b, p. 146; Houmanfar et al. 2010, p. 69).

Finally, in addition to the new term *cultural-organizational milieu* introduced at the beginning of the model, the five-term model also adds the term *group rules* at the end of the model to describe the process through which the relationship between the dimensions of the aggregate product and its differential selection by consumer practices in the external environment may be analyzed via metacontingency analysis. Just as rules generated by an individual (as they relate characteristics of their behavior or its products to the differential selection of a product of their behavior by others external to themselves) may serve as an antecedent to their future behavior, group rules relating the differential selection of an aggregate product of a socio-IB via consumer practices may similarly serve as antecedents for future occurrences of the socio-IB (Houmanfar et al. 2010). This process, while not included in the unit of the metacontingency expressed in the three-term model, is explicitly mentioned in discussions of how the perspective offered by the metacontingency may lead to cultural and organizational interventions (see Glenn & Malott, 2004b; Sandaker, 2004).

Criticisms of the Metacontingency

Theorists have conceptualized the metacontingency as a higher-level complement to the traditional operant contingency that governs individual behavior and have cast it as an emergent, cultural level of selection. Their efforts have not gone without criticisms, however, and these criticisms have developed along several different fronts. Mattaini (2004; 2006) provided one of the initial criticisms of the metacontingency, observing that many of the early publications on the metacontingency were purely theoretical in nature and that there was a dearth of empirical studies testing metacontingent properties. Mattaini (2006) asserted that no one had even gone so far as to define the elements of the metacontingency that might be experimentally manipulated, and even questioned if such elements existed. Since the time of this criticism, numerous empirical studies, many of which have been published in this journal (see, for example, Morford & Cihon, 2013; Sampaio et al, 2013; Smith et al. 2011; Vichi, Andery, & Glenn, 2009), have been conducted, beginning to address this concern.

Boundaries of Analysis and Units of Analysis

Mattaini (2004) also offered a second criticism, stating that the field of cultural analysis in general (and, by inference, the metacontingency specifically) had not yet clearly defined the boundaries of the domain or the appropriate units of analysis, making it essentially impossible to evaluate the contributions that were being made by such theories. As an example of the lack of defined boundaries, we might consider several of the contrasts between the three-term and five-term models of the metacontingency. For example, the five-term model includes the cultural-level analog of antecedents, the cultural-organizational milieu, as part of its unit of analysis while the three-term model does not. Given that Glenn (2010) also acknowledged that environmental events and conditions may be relevant to the recurrence of IBCs, the theorists of both metacontingency models appear to agree this term should be included in its definition. However, the five-term model includes the generation of group rules as integral in the general description of the metacontingency, while the three-term model considers it instead to be a particular process that may operate in the selection of a specific metacontingency (see Glenn & Malott, 2004b; Sandaker, 2004).

In the three-term metacontingency model, a member or members of the organization certainly may, for example, analyze the relationship between the aggregate product and its selection by the

external environment and define rules describing this relationship (Glenn & Malott, 2004b). They may then, in turn, use the information contained in a rule to modify the operant contingencies governing the individual behaviors in the chain of behaviors linked by the IBCs (e.g., by articulating rules, providing feedback to the individuals on the measurement of particular dimensions of the aggregate products that are relevant in its selection by the receiving system, providing new, socially-administered consequences that reinforce the individual behaviors to supplement the naturally-occurring and direct-acting consequences that result given the behavior, etc.). Malott and Glenn (2006), however, include methods in addition to rules through which the effects of contingencies associated with the selection of the aggregate product by a receiving system might be communicated to the individuals performing the interlocked behaviors (e.g., see p. 49 for the discussion). Additionally, several empirical studies have found evidence suggesting that metacontingent selection cannot be reduced to rule-governed behavior (Sampaio et al. 2013) and even that rules of any kind do not appear to be required for the functioning of a metacontingency (Vichi, Andery, & Glenn, 2009). While it is clear that rules may have a significant facilitative effect in the selection of metacontingencies (Smith et al. 2011), it is not clear why they should be included as part of the appropriate unit of analysis to the exclusion of other means through which the selection of metacontingencies might also occur.

A second area in which there is an apparent lack of clarity with respect to the metacontingency as a unit of analysis stems from consideration of the external system(s) that select the aggregate product. While both the three-term and five-term metacontingencies highlight such a selection process as critical to the understanding of the metacontingency, there is no clear definition as to what “external” means. For example, the literature provides numerous examples where the individuals involved in the selection overlap with those that are involved with the production of the aggregate product (see Houmanfar & Rodrigues, 2006) and even several examples where the members of the IBC/socio-IB and the members of the receiving system are one and the same (Todorov, 2010). It is not clear, then, what “external” is intended to mean and, if the members of the receiving system may be synonymous with those participating the socio-IB, it is not clear what affect this might have on the selection processes at work within the metacontingency.

Emergence and the Metacontingent Perspective

Todorov (2013) articulated a third criticism of the metacontingency that remains unaddressed. He suggested that the metacontingency does not represent a new, over-arching level of cultural selection, but is instead a given process (albeit one with some relatively complicated characteristics) that is itself subsumed within a broader and more general behavioral process. He suggested that Ulman’s (1998) concept of the macrocontingency (defined as a set of differing actions of different individuals under common postcedent control) might provide a broader construct under which the metacontingency might be subsumed. Several others have expressed similar views (Hobbs, 2006; Marr, 2006, Mattaini, 2004, 2006). Mattaini (2004, 2006) specifically argued that the other, more parsimonious theories supersede the metacontingency and account for all of the phenomena that metacontingent relationships are said to produce. Mattaini (2004), for example, challenged the necessity and relevance of the metacontingency by asserting that interlocking practices and interlocked behavioral contingencies are observed in numerous cooperative and competitive behaviors that occur in contexts where no aggregate product is produced. Mattaini (2006) also argued that we should limit the focus of cultural analysis simply to the level of interlocking contingencies, which, in his opinion (at least at that point in time) offered

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a simpler and sufficient explanation of cultural phenomenon. This level of analysis also provides for the identification of observable variables that might be manipulated, potentially leading to improved prediction and control of cultural phenomenon.

The argument that there are more parsimonious theories that account for all phenomena that the metacontingency is intended to address stands in contrast to the claim of several authors that the metacontingency is an emergent phenomena. For example, Glenn (2004) talked about various aspects of the metacontingency as being emergent, emphasizing that cultural phenomena like the metacontingency are not wholly reducible to individual behavior(s), a claim that was shared by Houmanfar et al. (2010). Consequently, attempts to reduce the cultural phenomena, which are of a higher level of analysis, to the individual behaviors in the IBCs, for example, are fundamentally invalid.

Marr (1996) explained emergence in the following terms:

This distinction [emergence] addresses the issue of whether phenomena at one level of observation are totally accountable by events taking place at a subadjacent level, or, whether novel or qualitatively different events can emerge unpredictably from any consideration of the reductive components. Another way of expressing this is to consider if a system is always analyzable or understandable in terms of the properties of its constituents. (p. 21)

Houmanfar et al. (2010) asserted that emergent phenomena require a qualitative and substantive difference from those phenomena that operate on a lower-level. They suggested that novel and qualitatively different cultural or sociological characteristics may emerge from the interrelated behavior of individuals. However, the emergent cultural or sociological characteristics cannot include longer patterns of behavior, for example, or a change in the tempo of an activity, which would not qualify as emergent—given that they can be accounted for using the same behavioral principles and theories as simpler behaviors. Evidence that there are substantive differences present within a given context might be noted through the development of new units of analysis and new units of measurement that are not relevant at a lower level of analysis but are of particular relevance at a higher level of analysis. Marr (1996) illustrated this differentiation using the example of temperature; temperature emerges as a relevant unit of analysis that describes the aggregate effect of the movement of particles. It is of no relevance when describing the movement of a single particle, but is of relevance at higher levels of aggregation.

The concept of emergence has been used in reference to other behavioral phenomena going back as far as the 1960s. Lindsley (1966), for example, ascribed emergent properties to social behaviors that were not observed in nonsocial behavior. He carefully and purposefully used this term, going so far as to say, “If social interaction does not produce emergent properties over and above similarly complex transactions with non-living systems, we have no need to generate a special class of terms to describe social behavior, since we can consider it merely a part of the field of complicated discriminations.” (p. 474). A similar argument may be made in the case of the metacontingency—if no new properties are defined in the case of metacontingent selection that extend beyond those accounted for by previously defined principles of behavior at the individual level (including “mere” social behavior), then we have no need to define a special class of terms to describe the metacontingency.

Four claims of emergence in the metacontingency. According to the literature, metacontingencies involve emergent processes or characteristics that cannot be reduced to the

behavioral level in at least four different ways. Glenn (2010) has articulated perhaps the clearest explanation of the rationale for the first three types of emergence credited to metacontingencies—the emergent organization that is the IBC itself, the emergence of an aggregate product that is “more” than what might be produced by an individual, and the emergent cultural selection process—while explaining the three-term metacontingency. In this model, each part of the metacontingency constitutes an emergent phenomenon.

First, while the particular IBC in a given metacontingent relationship is built upon operant contingencies for the individual behaviors in the chain, the summation of the individual operant contingencies does not fully represent the whole of the IBC, which is emergent and exists at a supra-behavioral level. Glenn claimed that IBCs between behaviors of several individuals occur frequently, but *recurring* IBCs are rare and are due to a source of selection beyond the operant contingencies governing the individual behaviors. According to Glenn (2004), principles of operant selection govern the individual behaviors involved in the chain of IBCs. This, however, is not the case with the selection of metacontingencies. Quoting Skinner (1984), she writes:

The prefix *meta-* together with the root *contingencies* is intended to suggest selection contingencies that are hierarchically related to, and subsume, behavioral contingencies. They represent “a different *kind* of selection,” although “no new behavioral process” is involved (Skinner, 1984a, p, 504). Metacontingencies are not a matter of an enlarged class of behavior or more widespread behavioral contingencies; rather, they are the engine of a different *kind* of selection. (p.144)

The operants in the IBC interact to produce an aggregate product that is “more than” or “different than” the outcome that might be produced by any of the individual actors in the chain of IBCs (Glenn, 2004, p. 145), an assertion from which Houmanfar and Rodrigues (2006) claimed that it might be surmised that the outcome is emergent (the second form of emergence). Next, Glenn (2004) has claimed that the cultural selection process that governs the evolution of the interlocking behavioral contingencies (IBCs) is a different kind of selection than the operant selection process that operates on the behavioral level (see quote above—the third form of emergence). Finally, as mentioned previously, Houmanfar et al. (2010) argued that the analysis of IBCs requires a “whole-group,” or sociological, analysis that is a fundamentally different and emergent analysis (the fourth form of emergence) than the analysis of the individual behaviors of participants within the chain of interlocked behaviors (the psychological level). This process of whole-group analysis generates the group-rules as defined in the five-term metacontingency.

Challenges to the claims of emergence in the metacontingency. Both models of the metacontingency share three distinct features. First, as we have seen, both share an emphasis on the novelty, or substantive difference, of *recurring*, interlocked chains of behaviors across individuals, linked through a set of IBCs. Next, when a recurring IBC/socio-IB produces an emergent aggregate product (the second distinct feature), an emergent cultural selection process (the third distinct feature) results through which consequences resulting from the selection of this aggregate product by an external environment form the basis through which a given set of IBs/IBCs may be reinforced. Houmanfar et al. (2010) compared the sociological-level, metacontingency selection process with a psychological-level, operant contingency where an individual produced a product with which another person interacted at a later time in an effort to show the similarities between the two. We will examine the claims of emergence made for the metacontingency by making a similar comparison.

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Behavior analysts have long used interlocked chains of behaviors and chained schedules of reinforcement to achieve outcomes of increasing complexity both in the lab and in application (Ferster and Skinner, 1957; Rachlin, 1976). Individuals perform complex chains of behaviors (IBs linked together through IBCs) to produce complex products in innumerable ways. Within such a chain, if we independently analyze the behavioral contingencies affecting any one behavior in the chain to the exclusion of the whole, the totality of the contingencies governing the individual behavior (and the successive behaviors in the chain) will not be fully represented. In many cases, none of the individual behaviors, when performed in isolation, would be sufficiently reinforced by their naturally occurring consequences to be sustained. As part of a chain of interlocked behaviors, however, they are maintained through consequences that are only produced upon completion of the chain. At both the individual- and group-levels, behavioral contingencies at each step in the chain and the delayed, indirect consequences stemming from the selection of the aggregate product by an external environment and that apply across all behaviors in the chain, would be identical, with the possible exception of socially-provided consequences provided by one individual to another in the organization. However, individuals provide social consequences to each other in myriad situations, and such social behavior is not an emergent phenomenon that arises solely and uniquely within the context of the metacontingency.

It is worth noting that even complex chains of interlocked behaviors producing aggregate products that occur in social systems such as commercial organizations may ostensibly be performed by a single, sufficiently-trained, and skilled individual, albeit at a slower rate and thus occurring at a reduced frequency. For example, Glenn (2004) and Houmanfar et al. (2010) both referenced an illustration of a metacontingency involving a couple making dinner together for a dinner party, to which they had invited their friends. Glenn argued that the dinner (an aggregate product of perfectly timed courses of perfectly prepared dishes) could not be made by combining the results of both members working in separate kitchens; however, she did not provide any rationale as to why this was the case. Either member, with sufficient practice and planning, could likely produce a meal identical to the one that the couple had produced together, albeit perhaps at a slower rate. As Houmanfar et al. pointed out, a longer pattern of behavior, or a change in tempo for a behavior, does not alone meet the criteria for emergence since a change in such extensive quantities does not constitute a substantive or qualitative difference. The overall rates and frequencies of behaviors for one group of individuals, each performing separate behaviors in the chain, would be substantively matched by the same number of individuals—each using the same tools and procedures as the group, and performing all behaviors in the chain in succession.

We may use this same example to question the assertion that the aggregate product itself is an emergent phenomenon (the second form of emergence that has been claimed for the metacontingency). It is similarly unclear how an aggregate product produced by the interlocked behaviors of multiple individuals differs substantively from a complex product produced by a sufficiently-complex chain of behaviors performed by a single individual. Malott and Glenn (2006) distinguished between three potential sources of aggregate products, two of which are relevant to the current discussion. First, they stated that an aggregate product can be the outcome of a multi-individual chain of behaviors such as is defined by the metacontingency. Second, they asserted that aggregate products may also be the cumulative outcome of people behaving individually. Houmanfar and Rodrigues (2006) pointed out that, when viewed from the perspective of the external receiving system, it is not possible to determine the particular behavioral contingencies that produced a given aggregate product. This would make it impossible for the receiving system to determine if the product in question was produced by the IBs of an individual or by IBs of

multiple individuals in sequence. If this is the case, then the aggregate product is not—by definition—substantively different. If it were, then these substantive differences could be used to differentiate between individually- and group-produced aggregate products.

The third form of emergence claimed for the metacontingency is that the cultural selection process, whereby a particular IBC is selected by an organization on the basis of the consequences provided to it upon the selection of the aggregate product by an environment external to the IBC, is itself emergent and, as such, is not reducible to the behavioral level of analysis. This assertion may be challenged on several fronts. First, we may return to the lack of clarity around the definition of what exactly constitutes an “external” system in the metacontingency literature. If the individuals involved in the production of the aggregate product can overlap (Houmanfar & Rodrigues, 2006) and can even be synonymous with the individuals in the receiving system that selects the aggregate product (see Todorov, 2010), then it is unclear how this selection process involves emergent characteristics beyond those which are operating at the behavioral level. Second, assuming that further development of the metacontingency stipulates that there is no overlap between the producing system and the receiving system, we may still extend the argument that the external systems cannot distinguish between an aggregate product produced by an individual and one which was produced by an IBC consisting of many individuals. If the source of the aggregate product cannot be differentiated, it is unclear how the consequences provided to the socio-IB upon selection of its aggregate product would be substantively different for an individual producer.

This brings us to the fourth claim of emergence for the metacontingency made by Houmanfar et al. (2010). They have claimed that metacontingent analysis is emergent in that it requires the analysis of the whole group, which they contend is “a fundamentally different type of analysis than those that target individual behavior (i.e., substantive emergence)” (p. 60). In particular, they assert that this emergent process of analysis involves relations between entire organizations and the consumers of their aggregate products. However, as has already been argued herein, it is unclear how these relations might differ from the relations that arise from the selection by consumers of a complex product produced by a single individual. Hence, we may argue that such an analysis does not constitute an area of substantive emergence that is unique to the metacontingency, if it differs substantively at all. Additionally, the relevant dimensions of the contingencies (such as the probability of occurrence, delay, schedule effects, etc.) of such an analysis appear in varying degrees of similarity to the dimensions considered in other types of contingent relations, making it unclear how the relations that arise upon selection of an aggregate product differ substantively from other forms of relations typically analyzed in other realms of behavior analysis.

Conclusion

This paper opened by examining the current state of a construct proposed as the fundamental unit of a cultural-level process of selection – the metacontingency. Skinner (1953; 1981) and Glenn (2004) espoused this cultural-level of selection to be a third kind of selection by consequences that complements natural selection and operant selection in the explanation of the variability in outcomes that we observe in the world around us. Proponents of the metacontingency have claimed that it is an emergent phenomenon, substantively different than that which occurs at lower levels of analysis (see Glenn, 2004, 2010; Houmanfar et al. 2010). Critics have questioned this assertion, countering that the phenomena addressed by the metacontingency have already been accounted for by more parsimonious theories (Marr, 2006; Mattaini, 2004; 2006; Todorov, 2013).

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In an effort to resolve the tension created by these two positions, the current discussion has scrutinized the particular claims of emergence that metacontingency theorists have made, leading to something of a deconstruction of the metacontingency, comparing each term with behavioral-level phenomena, and questioning how each metacontingent unit might be substantively different. From this discussion, it is unclear how IBs across multiple individuals differ from IBs in a chain of behaviors performed by a single individual. It is unclear if there are substantive differentiates between an aggregate product produced by multiple individuals and a complex product produced by a single individual. It is unclear how the process through which an external system selects these two types of products might be different. Given that this is the case, it is unclear how the consequences provided to the producing system upon selection of an aggregate product versus a complex product, and how the *group-level rules* describing (a) contingent relationships between organizations (and its IBCs/socio-IBs), (b) the aggregate product it produces and (c) the selection of such a product by a system external to itself differ substantively from *individual-level rules* describing (a) contingent relations between their behaviors, (b) a complex product they produce, and the (c) selection of such a product by a system external to themselves. In each of these claims of emergence, the phenomenon involved appear to be readily explained by processes operating at the psychological-, or behavioral-level.

Houmanfar et al. (2010) suggested their refinements to the metacontingency model in an attempt to maintain clarity in the level of analysis of the metacontingency. They proposed terms for the metacontingency (including cultural-organizational milieu, socio-IBs and consumer practices) with the expressed goal of maintaining a consistent level of analysis at the group, or sociological level, basing their approach on a distinction made by Kantor (1982) and further developed by Parrott (1983). However, both Kantor and Parrott allowed for group functioning that occurs on the psychological level rather than at the sociological level. Kantor provided for cultural psychological groups that he termed *psychological collectivities*. He claimed that these psychological collectivities have a “particular function not found in the mere sociological organization of individuals such as civic, national, or commercial aggregations of persons” (p. 11), and that such collectives are not just a collocation or statistical aggregation of persons and their characteristics, but rather involve “genuine behavior interrelationships” (p. 11). He asserted that “the grouping of persons in this way bespeaks a thorough behavior commutuality between them” (p. 12) and that, in many cases, sociological organizations may contain numerous examples of psychological collectivities within their boundaries.

Parrott (1983) described the social episode as a sequence of instances produced by two persons responding in turn-like fashion, including situations where the responses might be mediated by an inanimate stimulus to which a social function had been transferred. She stated that such episodes, “in that they constitute collections of individual performances, are of a psychological character” (p. 539). She also allowed that, when we consider the joint performance as a unitary phenomenon, then the collective whole takes on a sociological nature, which Houmanfar et al. (2010) have attempted to apply in their refinement of the metacontingency.

As Houmanfar et al. (2010) pointed out, consideration of this type of sociological collective serves the purpose of statistically masking any individual-level considerations, and the data of concern moves away from “who” is involved and focuses on “how many” in its place. When adopting this perspective, we can no longer identify which particular events, conditions, etc. are serving as antecedents for the specific behaviors in an IB so we may instead identify the set of all possible antecedents as the cultural-organizational milieu. We may begin to identify how many socio-IBs are present within a given sociological organization. We may count the number of

aggregate products produced by those socio-IBs. We may talk about consumer practices at the aggregate level and compare the rate at which aggregate products painted red are purchased as compared to aggregate products painted blue and compare those rates with similar trends in society.

The selective processes that have been defined by the metacontingency in both the three-term and five-term models, however, seem to rely on psychological- or behavioral-level processes rather than sociological- or cultural-level considerations. Todorov (2013) advocated for Ulman's (2006) proposal that the metacontingency might be subsumed within Ulman's (1998, 2006) conceptualization of a *macrocontingency* (which differs significantly from Glenn's (2004) concept of the same name). Ulman's (1998) original definition of a macrocontingency involved the behavior of two or more individuals under common postcedent control. He modified this to be "the conjoint actions of two or more individuals under common contingency control" (Ulman, 2006, p. 96), going so far as to claim that his definition included all forms of interlocking behavioral contingencies. He did not limit his definition to address only those IBCs that produced an aggregate product, including many other forms of social behavior including cooperative, and potentially even competitive behavior. Critically, Ulman (2006) asserted that analysis of macrocontingent phenomena required only behavioral-level considerations. As he stated, "As with any operant analysis, a macrocontingency analysis requires explicit specification of the relevant behavioral phenomena.... That is, to qualify as subject matter for a macrocontingency analysis, the targeted behavior must be capable of being directly observable (i.e., actual)" (pp. 96-97).

Accepting the conclusion that the metacontingency as currently conceived has not yet gone beyond a behavioral-level of analysis and has not yet defined the *different kind* of selection process that occurs at the level of cultural selection does not relegate the concept to behavioral obscurity. The theorists and researchers that have done work in this field work have done a great deal to further our understanding of how social and cultural practices are developed and shared in the particular case where there is an inanimate object (the aggregate product) that mediates between two social entities (be they individuals or collectives of individuals), and will continue to do so as they pursue this area. However, if we accept this conclusion, then we may still be searching for the elusive third kind of selection—the cultural level—that Skinner (1981) believed would, when added to the processes of natural and operant selection, provide a comprehensive description of the changes that we observe in living systems.

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