

OVERCOMING BARRIERS TO EXTRAPOLATION: REPLY TO HOBBS

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Hobbs (2004) argued that there are two possible barriers to successful extrapolation of our analysis to the study of organizational phenomena; and successful application of our framework requires overcoming these barriers. As he sees it, one problem of our analysis is its generality to nonprofit organizations. The other limitation is the absence of data validating the model.

In response to the question of whether our analysis can be extrapolated to nonprofit organizations, we focused on business examples because they provided the clearest examples. It is our belief that the concepts we presented are applicable to organizations of all kinds, including nonprofit organizations. Organizations can be as diverse as a charity, a manufacturing plant, a political party, or a professional association. A defining element of an organization is its aggregate product. We are using the term "product" in a generic sense. We mean the aggregate result of interlocking behavior of multiple individuals. For instance, homes are the products of the organization Habitat for Humanity.

Some organizations are systems that contain smaller systems. Sub-systems of a university include academic departments, institutional research and human resources. Like the larger organization, each department involves a group of individuals whose interlocking behavior results in aggregate products, such as trained students, data and trained staff.

Metacontingencies account for the evolution of interlocking behavioral contingencies of organizations. This evolution is based on selection which is typically ignored in organizational change literature. We identified the elements of a metacontingency as interlocking behavioral contingencies, their aggregate products, and the receiving system (external environment) of their products. In an attempt to illustrate how our analysis applies to both profit and nonprofit organizations, we provide examples of several organizations and their metacontingency components in Table 3.

The reason organizations exist is to produce an aggregate product. Their success and long-term survival depend on demand from their receiving systems. So, Habitat for Humanity continues to exist only if there is enough demand from sponsors and needy families; the Red Cross would dismantle without requests from governments and afflicted groups; and so on.

Like it or not, financial resources are critical to the survival of most organizations. Money is the medium of exchange for goods and services. Table 3 presented examples of organizations, none of which has profit as its aggregate product; nonetheless, without financial resources all of them could not produce their aggregate product. Volunteer organizations that do not manage funding, for instance, special interest groups and neighborhood associations, need resources as well, for example, volunteer time. Despite the noblest of intentions, enterprises that do not establish financial contingencies for their participants typically are less productive than those that do.

TABLE 3: SAMPLE ORGANIZATIONS AND METACONTINGENCIES

Organization	Metacontingency Components		
	Interlocking Behavioral Contingencies	Aggregate Product	Receiving System
Habitat for Humanity	Sub-systems such as: marketing, research, purchasing, human resources, and construction	Houses	Sponsors and low-income families
Red Cross	Sub-systems as: Research, scheduling, training, inventory, shipping and services	Medical assistance, food, shelter and clothing	In wartime: governments, wounded soldiers, civilians, war prisoners In peacetime: governments, disaster victims
City of Boston	Sub-systems such as: utilities, parks, police, and planning and zoning, and courts	City infrastructure, citizens' safety	Citizens, businesses

Hobbs' (2004) second concern was the lack of data to support our analysis, a concern shared by Mattaini, Ulman, and Hayes and Houmanfar. Unfortunately, an adequate treatment of measurement requires more space than we had in the focus paper. Measurement deserves an article to itself because it is essential both for a scientific account and for managing organizational change. Questions arise as to what and how to measure to allow comparisons across organizations and to evaluate the impact of interventions.

Next we briefly address measurement of behavior and cultural phenomena. Table 4 illustrates distinct types of contingencies. We believe that the distinctions we make among these scenarios are rarely acknowledged; and failure to make these discriminations results in poor communication, interpretation and effectiveness. In Table 4, we italicized measurable variables.

The first example identifies an intervention designed to decrease the frequency of a single worker's arriving late to work by making a written reprimand contingent on late arrival. Delivering a consequence contingent on the behavior of an individual is a defining characteristic of contingency management in applied behavior analysis. The planned result of such intervention is a change in the frequency of late arrivals over time. This is an example of operant selection.

The second example identifies an intervention designed to increase the frequency of returning recyclable bottles by paying for their return. The aggregate effect of this behavior of many individuals is the reason for the intervention—reduced waste. The intervention is designed to affect the same behavior of many independently behaving individuals. As in the example above, the result of this intervention is a change in the frequency of behavior over time. This is also an example of operant selection. The difference between this and the previous example is in the number of people whose behavior is targeted (see Glenn, 2004).

The third example identifies an intervention designed to pass an ordinance to restrict smoking in government buildings. This product resulted from the interlocking behavior of many individuals. The interlocked behaviors do not recur—the product, ordinance, is produced only once; therefore there are no contingencies of selection and no lineages.

The fourth example identifies an intervention designed to decrease delayed delivery of newspapers to the distributor. The product—delivery of papers—is the result of the interlocking behavior of many individuals. There is a contingency between repeated delayed deliveries and penalties to the newspaper publisher. This penalty contingency will affect the interlocking behavioral contingencies; thus, this is a metacontingency. This is an example of cultural selection.

The fourth example describes the type of situation that characterizes our analysis—one that involves recurring interlocking behavioral contingencies of multiple individuals that generate an aggregate product, and where the external environment has a selection function. Although all the examples except the first one represent some kind of cultural change, only the last one is an example of a metacontingency. The last example illustrates most of the situations we encounter in organizations when we attempt to change them, and that is why we are interested in this particular type of selection.

So in the metacontingency example, what can we measure to ascertain the effects of interventions and compare performance across organizations? We discuss several measures we have found useful in bringing about organizational change. The numbers in Table 4 correspond to the measures described below.

- 1) Measures of the aggregate product, for instance, frequency of on-time deliveries.
- 2) Measures of the implementation of the functional consequence, for instance, how often the penalty was levied.
- 3) Measures of key behaviors that are critical links in the interlocking behavioral contingencies. Usually organizational aggregate products involve thousands and perhaps millions of interlocked behavioral contingencies. It is impossible and unnecessary to attempt to measure all of these links. Measuring a link entails observing samples of the product of one behavior and receipt of that product by its receiving system.
- 4) The overall set of interlocked contingencies can be measured in several ways, for instance, labor cost for producing the aggregate product is calculated by the sum of the labor hours multiplied by the average labor cost per hour.

TABLE 4. TYPES OF INTERVENTION

Intervention	Target	Number of Organisms	Product	Functional Consequence	Locus of Change	Contingency of Selection
Reprimands for arriving late to work	Single behavior: arriving late to work	One	Non aggregate: Work product delayed	Written reprimand	Single lineage of operant responses	Operant contingency
Paying for returning recyclable bottles	Single behavior: returning bottles	Multiple	Aggregate: Reduced waste	Reimbursement	Multiple lineages of operant responses	Operant contingencies
Passage of city ordinance restricting smoking in public buildings	Multiple interlocked behaviors: researching, interviewing, reviewing, writing, lobbying	Multiple individuals	Aggregate: Ordinance	None	None	No contingency
Additional charges for late delivery of daily newspapers to distributors	(4) Multiple interlocked behaviors: recording, (3) scheduling, counting, loading, delivery	Multiple individuals	(1) Aggregate: Daily newspaper delivered	(2) Additional charges	Single lineage of interlocking behavioral contingencies	Metacontingency

All these measures are taken as a series of snap shots. We are interested in change over time in the snap shots. Because we are dealing with lineages of interlocking behavior and its products, repeated measures are necessary. They allow us to compare the measures before and after interventions and also to compare performance of different organizations.

Although, the research literature is full of studies that demonstrate the effects of environmental conditions on behavior, it will come as no surprise that there are not much experimental data on complex units of analysis. In part, this is because there is still much debate on what the unit of analysis should be. The commentary on our article suggests that we have a long way to go to reach consensus on the best way to approach the analysis and change of organizations. We believe that the metacontingency is a useful unit to study complex organizations.

We thank Hobbs (2004) for a stimulating and thoughtful commentary that gave us the opportunity to elaborate on some of the critical issues pertaining to our analysis. We believe that we can overcome the barriers Hobbs identified to extrapolation of our analysis and hope we have allayed his concerns.

REFERENCES

- Glenn, S. S. (2004). Individual behavior, culture, and social change. *The Behavior Analyst*, 27, 133-151.
- Hobbs, S. (2004). Barriers to extrapolation? *Behavior and Social Issues*, 13, 116-118.