Journal of Behaviorology

ISSN 2331–0774

The journal of TIBI: The International Behaviorology Institute

Behaviorology *Conductologia* *Xingwei Xue* *Gedragsologie* *Behaviourology*

Contents

Note: Prior to Volume 16, Number 1 (Spring 2013) the *Journal of Behaviorology* went by the name of *Behaviorology Today,* which occasionally published fully peer–reviewed articles, explicitly so labeled. Beginning with Volume 15, Number 1, *all* new material receives full peer review. See the "Submission Guidelines" for details.

* This issue does not contain any TIBI course syllabi. New syllabi, or updates of previous syllabi, may appear in future issues. (See the *Syllabus Directory* for details.)

Volume 18, Number 1 **Spring 2015**

Editorial

James O'Heare

Companion Animal Science Institute—Ottawa, Canada

The theme in this issue appears to be exploring the boundaries of behaviorology. One paper explores behavior in a cultural context and the other explores behavior within a philosophical and physics contexts.

The paper titled *A Preliminary Culturological and Economic Analysis on the Influences of Mating Behavior* by Kanouse, Sigurjónsson and Espinosa, demonstrates that the study of behavior at the cultural level of analysis is better off with the contribution of behaviorologists. Kanouse and colleagues use actual outcome data as opposed to the usual verbal report data to study mating behavior as a cultural phenomenon, avoiding the almost ubiquitous validity confound in some disciplines of looking to *reports* of phenomena rather than the phenomena itself. It is an interesting study that I hope will prompt other behaviorologists into further culturological research. As a point to assist readers, a behavior happening is a real event with stimulus status for other events, including other behaviors, which makes behavior–behavior events real parts of behaviorology.

The other paper in this issue, *What is Reality to an Organic Unit of Matter? Some Physics of Behavior with Implications for Sentience and Sociality* by Fraley, presents a penetrating treatment of the topic. The topic is challenging, because "the thematic content of the paper undermines much of what we have relied upon to anchor our traditional conception of sociality" (Fraley, 2 January 2015, Personal Communication). One of the challenges that this topic presents is that the conclusions about what we can and cannot know, and what must be assumed regarding reality, are clear, and the logic unassailable; however, it flies in the face of conventional/traditional epistemology and ontology.

Providing additional perspective on the topic, in his paper, *In Response to Fraley,* Ledoux points out that in the day to day work of behaviorologists, these considerations and philosophical positions ought not evoke extreme discomfort, that there is no immediate rush to abandon the familiar, naturalistic exterior perspective in favor of the interior perspective, as Fraley describes it. Eventually, through discussion and works such as these, integration will take place, but for now the naturalistic exterior perspective retains an adequate measure of practical appropriateness.

I would add that a big part of the integration of the interior perspective within applied behaviorology, and service provision, will come from recognizing the accuracy of the interior perspective in terms of *what we can know about* "what is" (as opposed to simply "what is") and utilizing the exterior perspective, for now, as a clearly stipulated practical assumption. Contingencies evoke the responses that we cannot know for sure that an external reality exists while still stipulating it as an assumption in generating natural–science products. Clear qualification of this presumed or assumed perspective is appropriate as long as it is stated as such, leaving us to move forward with a natural science of behavior, utilizing an external assumption without complete and immediate upheaval of the familiar naturalistic paradigm. There is indeed no need to abandon the current foundation of what we do, but merely stipulate it as a working or practical assumption. Fraley will have more to say on these topics in issues to come.

Also, I would like to bring a little context to this discussion for those unfamiliar with the history of the topic. In *General Behaviorology: The Natural Science of Human Behavior* (Fraley, 2008; Canton, NY: ABCs), in setting aside the non–natural *agential* perspective, Fraley extensively discussed both the *environmental* perspective and the *robotic* perspective. However, in his current paper, Fraley uses the term *traditional* perspective to refer to the environmental perspective and the term *internalized* perspective to refer to the robotic perspective. Ledoux then, in his *In Response to Fraley* paper, mentions Fraley's specialized terms. However, to maintain continuity not only with Fraley's 2008 book but also with his own 2014 book (*Running Out of Time—Introducing Behaviorology to Help Solve Global Problems;* Ottawa, Canada: BehaveTech Publishing) Ledoux retains, in his *In Response* paper, the original naturalistic terms *environmental* perspective and *robotic* perspective. Taking note of this now will reduce confusion when reading the papers.

Finally, I would like to thank Philip Johnson for his turn–at–bat with editing the *Journal of Behaviorology.* It is not as simple a project as it may seem and I hope that my turn–at–bat will work out as well as his did. I would also like to acknowledge the immense efforts of Stephen Ledoux as Managing Editor, who does much of the work but without the "glory," if one may put it that way.

Also, some special events are planned for the *TIBI 28th Behaviorology Anniversary Convention,* which has been scheduled for 5–7 June 2015 in Vancouver, BC. For information, check the TIBI website or contact members/coordinators Bruce Hamm or Katie Rinald (e–mail: katie@coastaba.ca or brucehamm@me.com).

A Preliminary Culturological and Economic Analysis on the Influences of Mating Behavior

Samantha L. Kanouse *City College, CUNY**
Jón G. Sigurjónsson *City College, CUNY*
Adriana Espinosa *City College, CUNY*

Abstract: This study presents a preliminary analysis that examines the influence of cultural and economic variables on mating behavior across westernized cultures. Mating behavior was defined as a combination of birth and marriage rates per country. The economic variables used were selected according to research in the evolutionary psychology field, which focuses on the accessibility of resources and its influences on behavior. Most research examines mating behavior from the point of view of self–reported questionnaires. This study presents a different metric, as it uses publicly available, macroeconomic variables. In so doing, this study is able to present an objective measure of mating behavior. Predictors of mating behavior were initially divided into two categories: economic and cultural. The economic predictors used were GDP, the GINI coefficient, and unemployment rates. The cultural predictors amounted to Hofstede's Six Cultural Dimensions. The results show that marriages and births increase in cultures that are flexible, cooperative, open to new ideas, and rely on traditional problem solving strategies. Marriages and births also increase when cultures are in a financial surplus, however the surplus is unequally distributed amongst members.❧

As behaviorology grows and evolves as a science, it is important for the natural science of behavior to expand the fields of inquiry not only into the field of biology and physiology (Hull, Langman, & Glenn, 2001; Donahoe & Palmer, 2004), but also into what has been labeled culturology (see for example Ledoux, 2014). Usually within the sphere of sociology, anthropology, or even evolutionary psychology, this branch of the natural science of behavior has not been shown the same attention and care as the other levels of analysis.

The scientific study of behavior can be performed on multiple levels (Hull et al., 2001; Donahoe, 2012). More specifically, behaviorology and behavior analysis are concerned with the individual organism level of analysis, whilst biology, physiology (and to some extent physiological psychology) are concerned with the physiological basis of behavior. The third level, the behavior of groups and selection of group behavior is somewhat less explored within the extended realm of behaviorology. It is worth noting that within evolutionary theory and philosophy, as well as behavioral theory, there is a lively debate on the term "group selection" and if there is in fact such a thing as group selection. These arguments, as interesting and valid as they may be, would only serve to distract from the topic of this article, but we point the reader to the following resources if they wish to learn more about these debates within evolutionary psychology (Pinker, 2012; Wilson, Van Vugt & O'Gorman, 2008; Wilson & Wilson, 2007) and behavior analysis (Glenn, 1988, 2004; Houmanfar & Rodrigues, 2006; Houmanfar, Rodrigues & Ward, 2010).

When analyzing the behavior or organisms, whatever level we are analyzing, the consequential causality model is the most appropriate model to analyze human behavior (Delprado & Midgley, 1992, Dennett, 1978). Within the selectionist framework, both evolution and operant learning are examples of a selection process that can best be summarized as consequential causality as both Pennypacker (1992) and Hull et al. (2001) have previously pointed out.

As Ledoux (2014) has pointed out, the term culturology might well become only a temporary name for a science of cultural analysis that has not yet been fully formed. The first steps to develop that science would be to identify the possible units of analysis, and how they interact. However, in culturology, the identification of the relevant variables can become quite difficult. Culture, at its core, is a collection of behaviors. If culture influences

*Address correspondence regarding this article to slkanouse@gmail.com.

Keywords: Behaviorology, culturology, selectionism, multi–level selection, evolution, Hofstede's 6 dimensions

the behavior of groups, we are looking at behavior–behavior interactions, which is somewhat the antithesis of a traditional behaviorological analysis. However, as Hull et al. noted, each level of selection will have a unique 'flavor'. For example, it is not immediately obvious if extinction bursts happen at every level, or if adjunctive behavior can be analogous to mutations (see for example Dawkins, 1984), and if selection processes at different levels need to be identical, the analysis will be restricted to only a handful of fields like genetics and immunology (Hull et al., 2001, p. 512). Selection, as defined by Hull et al., is "*repeated cycles of replication, variation, and environmental interaction so structured that environmental interaction causes replication to be differential*" (Hull et al., 2001, p. 513). Additionally, although each level of selection has its unique characteristics, they all share the same three basic characteristics, namely variation, replication, and environmental interaction (Hull et al., 2001). Both Hull et al. and Donahoe (2012) also emphasize the role of retention as an important unit in the selection process (Donahoe replaces Hull et al's third characteristic with retention). In light of this, one of the goals of the current analysis is to explore the possible units of analysis for future studies of culturology (i.e. identify the units that are replicated, the variation within those units, and to chart the environmental interactions, as well as to begin to understand the mechanisms of retention).

Cultural Classification

Intuitively and anecdotally, cultures differ in substantial ways. Some place more emphasis on competition, others on group cohesion, whereas others might promote safety at the cost of privacy or freedom. As good as intuition and anecdotes are, they are not the appropriate tools for a scientific analysis, let alone when the subject matter is as complicated as culture and the behavior of groups with which the researcher might never have even been in direct contact. Therefore, a systematic and empirical classification of cultures is an essential starting point to any empirical, cultural analysis. In this regard, Hofstede's cultural classification model is perhaps the most useful for the current analysis. Hofstede's classification is based on verbal reports from a worldwide questionnaire regarding motivation and cultural norms. These macrostructures shape behavior through a variety of means such as negative reinforcement where members within a community are reinforced to participate in normative behavior through other members' monitoring of their behavior, or the assumption thereof. In this cyclical pattern of within group behavior modification, repetition towards the norm encases a cultural practice where members fall into a systematized cultural structure of repetitious behavior with continual negative reinforcement. In this, normative behavior is a self–regulated system that is specific to that culture where normal can only be stated as normal if it reflects the group's repetitious behavior, and not a generalized concept across cultures. In behaviorological terms, the scale could therefore be interpreted as a list of rules that are said to influence behavior of individuals in each culture. It should be noted that these numbers are relative to each other and the best way to understand dimensional scores is in a comparison model. It is also worth noting that these numbers are stated preferences by members of these cultures, not recordings of actual behaviors. However, until we have other measurements these indices will have to suffice to measure cultural rule governed behavior.

Power Distance Index (PDI): This dimension describes how members of a culture accept how power is distributed (Hofstede, 2012). Countries with low PDI strive for equality and demand reasons for unequal treatment and dispersion of power. In contrast, countries with high PDI are comfortable with unequal dispersions of power and accept structured hierarchies. For example, China has a PDI score of 80, which corresponds to a country that is comfortable with a rigid cultural structure, and whose members do not attempt to decrease unequal power relationships. Sweden, on the other hand, has a PDI score of 30, which means that its members attempt to reduce unequal treatment within the country. Of course, the Chinese attitude towards a ruling class could be due to other factors such as fear of the ruling party or fear of retribution (5 Myths About the Chinese Communist Party, Foreign Policy, 2011). Nonetheless, in this particular example the attitude reported is only a first order approximation of the behavior observed in Chinese culture.

Individualism versus Collectivism (IDV): This dimension represents whether the members of a culture are focused on individuality or the collective whole (Hofstede, 2012). A high score on this dimension would express individuality where each individual is responsible for themselves alone or very close familial members. A low score, on the other hand, expresses collectivism. Collectivism differs conceptually and in application where the individual is not more important than the whole and the society is a tightly knit framework of loyalty where the members care for each other unconditionally (Hofstede 2012). For example, Costa Rica has a IDV score of 15 which expresses that trust and building long lasting relationships is paramount. The United Kingdom, in contrast, scores an IDV of 89, which expresses a strong orientation to the individual and their immediate families.

Masculinity versus Femininity (MAS): This dimension represents how the collective whole orients towards either high achievement affiliation or cooperation. A high score

is represented by masculinity, which is in turn associated with dominance, achievement, heroism, a defined winner, assertiveness, competitiveness and material rewards. A low score is represented by femininity, which is associated with passivity, a preference for cooperation, modesty, caring for the weak and focusing on the quality of life for all (Hofstede, 2012). The latter is also more consensus–orientated ensuring that all members are taken into account. It is important to note that these gendered terms and definitions are not systematically synonymous with common gendered associations and the purpose for not amending these labels is to keep consistency between this paper and the Hofstede dimensions. An example for this dimension would be extremes between Japan and Denmark. Particularly, Japan has a MAS score of 95, showing the culture's high need for success and achievement. However, this is a highly collectivist society meaning that their masculinity score is represented through group competition where loyalty within groups is paramount. Denmark has a MAS score of 15, which represents a cultural desire towards cooperation and increasing the quality of life for its members.

Uncertainty Avoidance Index (UAI): This dimension measures how uncomfortable a country's members are with uncertainty and ambiguity about the future (Hofstede, 2012). A high UAI score represents a culture that is rigid in its beliefs and intolerant of unorthodox behavior and ideas, a culture that takes a more conservative direction. A low score represents a culture that is relaxed about uncertainty in future outcomes, and focuses on practice rather than principles. For example, Greece has a UAI score of 100, which suggests that the Greek culture maintains a rigid planning structure for the future, regardless of the practicality of such. In contrast, Jamaica has a UAI score of 13, which suggests that deviance from the norm is easily tolerated and schedules are flexible.

Pragmatic versus Normative (PRA): This dimension expresses how a culture deals with past and current practices, as they apply to future development of the country (Hofstede, 2012). A high score, (i.e. pragmatic) is descriptive of a culture that encourages modern education as a way to prepare for the future. A low score (i.e. normative) corresponds to a culture that expresses preference towards maintaining traditions and norms, and is resistant to change. For example, Germany receives a PRA score of 83, descriptive of a pragmatic culture. Iceland has a PRA score of 29, which means that its members are orientated towards an absolute truth, respect traditions, and focus on achieving quick results.

Indulgence versus Restraint (IND): This dimension expresses how a culture handles "basic human drives" (Hofstede, 2012). A culture with a high score is characterized by indulgence, which favors free gratification and enjoyment of life. A culture that has a low score, on the other hand, is more interested in the suppression of gratification and therefore favors regulation through strict social norms. For example, Mexico scores a 97 on IND whereas Russia scores 20 on IND. This indicates that relative to Russia, the Mexican culture is more indulgent, optimistic, and values leisure time higher than the Russian culture whose members are more restrained and strictly adhere to social norms.

Evolutionary Psychology

Very few social and behavioral sciences provide explanations that can either be assimilated to, or be related to evolutionary theory such as ethology and sociobiology. *Selectionism* is a school of thought that aims to use the explanatory framework of evolution to explain behaviors and activities of living humans and animals. In a similar vein, evolutionary psychology tries to explain and understand human behavioral patterns that are thought to be innate due to the evolution of the species. These would include behaviors such as mating practices, and mate preferences, but also classical psychological concepts such as memory, perception, and language. However, the results of research in evolutionary psychology are typically explained with reference to biological selection, increase survival value, and individual fitness. Nonetheless, evolutionary psychology's explanations do not fit within the selectionist framework, which brings into question the extent to which assimilation to evolutionary biology or other selectionist sciences is likely. Moreover, theories from evolutionary psychology are often extrapolations of behavioral research, much of which has never been empirically verified. As such, evolutionary psychology may not be able to provide a narrative that is based on current behavioral research. As this paper will highlight, cultural variables are both dynamic and have relative consistency. More specifically, while changes in cultural norms will influence its members' behavior, when held constant for long periods of time they create strong normative practices for any culture.

Current Study

Purpose

In this study we investigated the relationships between cultural and economic variables and their impact on mate selection behavior. The goal of the current analysis is twofold: (a) to explore the possible units of analysis for future studies of culturology (i.e. identify the units that are replicated, the variation within those units, and to chart the environmental interactions, as well as to begin to

understand the mechanisms of retention), and: (b) to test the claims proposed by various schools of evolutionary psychology regarding the motivating variables in group behavior and norms, and how they can be aligned with a behaviorological (culturological) analysis, if at all. In order to reach the first objective we designed a pooled time–series cross–cultural analysis to assess the influential variables on mating behavior and thus units of selection. In order to assess the second, we used economic variables that are consistent with evolutionary psychology research and integrated cultural variables to evaluate potential impact on behavior. In its entirety this was a two stage study, first a dimension reduction to reduce variable overlap, second an exploratory correlation matrix to identify relationships amongst the variables and then a step–wise regression to assess which of the variables best impacted mating behavior, in terms of marriage and birth rates.

Variables

In order to examine the effect of environmental factors on mating behavior we collected the Hofstede 6 Cultural Dimensions (Hofstede, 2012) for the following western–based countries: Australia, Austria. Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. We recognize that the sample was culturally homogeneous, and this is a result of data availability. However, we must point out that the sample homogeneity is able to control for possible confounding effects in the analysis

The economic variables were collected from online public databases: WorldBank.org, CIA Factbook, Indexmundi.com, destatis.com and countryeconomy.com for the years between 2000 and 2010 (see Appendix 1 for the variable source list). The variables collected were selectively chosen based on prior research focuses on environmental factors that influence mating behavior, such as in Schmitt's (2005) article on sociosexuality which took a self–report measurement of 48 nations on individual's mating strategies. Schmitt examined whether a nation was more monogamous or promiscuous in sexual relationships, while addressing several evolutionary psychology theories such as sex ratio theory, parental investment and strategic pluralism. However, many of these theories rest on environmental or economic variables that project how individuals may behave in different economic environments. For example, in the strategic pluralism theory when economic resources are low, bi–parental investment should increase in order to increase the chances of the offspring surviving during hardships (Schmitt, 2005). However, Schmitt (2005) and Barber (2003) both found that when GDP is low, the onset age of pregnancy decreases, resulting in a higher rate of pregnancy amongst teenage girls. Hill, et al found that when economic resources are low, people spend less money on average on most products, with the exception of enhancements; women purchase more beauty products, which has been termed the "lipstick effect," in order to increase their chances of accessing men. While the exclusive use of economic variables does provide insight into how they influence behavior within a short time period, the addition of cultural variables provides a consistent framework, as cultural values do not fluctuate as quickly as economic variables do (Hofstede, 2012). Therefore, this study includes Hofstede's cultural dimensions and microeconomic variables representing environmental factors. The economic variables included are: Gross domestic product (GDP), the Gini index (GINI), and unemployment rates (UR). (Inflation rates were not included due to a large number of extreme values during the screening process. There were four out–of–range values for inflation and after computing a logarithmic variable for inflation, Iceland, Luxemburg, and Ireland went through an economic hardship that skewed the results for this study. Therefore, inflation was not used.)

Those variables together provide a collective representation of the economic status of a given country. In particular, the GDP measures a country's economic performance in monetary terms, and therefore provides a wealth–snapshot of the country as a whole as well as relative spending behavior. This is calculated as *compensation of employees* + *gross operating surplus* + *gross mixed income* + *taxes less subsidies on production and imports*. This variable is of particular interest given that much of the theoretical work hinges on how people's behavior shift in accordance to accessibility to resources. The Gini index provides a landscape of how income is dispersed among a country's members. It ranges between 0 and 100 points. Higher scores represent large income inequality similar to a monopsony, where only a few people control the country's wealth and consumption. Low scores represent high–income equality, equal dispersion of wealth. Unemployment rates describe the prevalence of individuals that are without work, (i.e. have limited or no access to resources). Traditionally unemployment rates increase as cultures or countries experience economic hardship (Evans–Lacko, Knapp, McCrone, Thornicroft, & Mojtabai, 2013).

In all analyses the dependent variable corresponds to a mating index (MI) computed using a country's marriage and birth rates, ($r = .158$, $p = .01$). The index ranges from 11.41 to 22.7 (Mean = 15.99, SD = 2.25) and higher numbers imply an increase in both marriage and birth rates. The use of marriage and birth rates together allows for an objective assessment of mating behavior, directly (birth rates) and indirectly (marriage rates). The marriage

rate variable is an approximate measure of monogamy versus promiscuity, where high rates of marriages will be interpreted as high rates of monogamy, whereas the opposite will be true as well. In so doing, this variable presents an alternative to measures of mating behavior based on self–reports.

Results

Principal Component Analysis

Prior to the main analysis, the 6 Dimensions were collapsed because of high collinearity measured by variance inflation factors (VIF) as high as 9.80. Additionally, given that there were nine explanatory variables, the degrees of freedom were compromised. Thus, it was necessary to use dimension reduction techniques in order to reduce redundancy between the variables. As such, a principle component analysis with an oblimin rotation was conducted which resulted in four of the six cultural dimensions merging into two independent components, thus moving from the six independent dimensions to two, combined components, with each item having a primary loading over .6 (as shown in Figure 1).

	Component 1 Power	2 Goals
Power Distance	.810	
Individualism	-.836	.438
Masculine Feminine		.814
Uncertainty Avoidance	.918	
Pragmatism		.644
Indulgence	-.802	
Note. Factor loadings <.30 are suppressed		

Figure 1: Principle component rotation: Hofstede's 6 dimensions

Factor loadings and communalities based on a principle components analysis with an oblimin rotation for 6 items from cultural variables

The first component is characterized by a combination of power distance (+), uncertainty avoidance (+) and indulgence (–) and is thus labeled Power. The second component is characterized by a combination of masculine/feminine (+) and pragmatism (+) and is thus labeled Goals. The sixth variable, individualism, had a cross–loading of over .45 and was excluded from the analysis. The Power dimension variable is defined as the measures and restrictions in place to control the population. A high score on this dimension would indicate a population that is socially hierarchical (i.e. categorical placement in a social system with minor mobility, which restrains behavior and uses traditional problem solving strategies). A low score on this dimension indicates a population that is socially flexible (i.e. major mobility within the social system, indulges in desires, and is open to new problem solving strategies). This cultural variable indicates that in culturally–westernized societies inequality and hierarchical structures trend together and emphasize restraining oneself from needs and desires. The qualities of restraint and rigidity or cooperation and flexibility are oppositional approaches cultures may take in their approach to dealing with the future and daily practices.

The Goals dimension variable is defined as the strategic direction and emphasis a population places on the access and achievement of material goods. A high score on this dimension would indicate a population that uses frugal expenditures and modern education to achieve material goods and success. A low score on this dimension would indicate a population that focuses on cooperation and strives for equality through normative practices to achieve a *good* quality of life. This cultural variable indicates that, in culturally–westernized societies that value material goods, the strategy used to achieve these goods is through economically frugal behavior, while when quality of life is the goal the dominant strategy used is cooperation among societal members. Figure 2 depicts the relative position for the 23 countries in this analysis in terms of the component variables, Power and Goals. It is worth noting that there is not a significant relationship between the two dimension variables and thus, most countries are neither both high or low on both dimensions and trend towards the middle or have more extreme positions for only one of the dimensional variables.

Correlation Analysis

We conducted an exploratory series of correlations in order to understand the predictive ability of all variables used in the study on mating behavior. First, the mating index (MI) had four correlations divided into three negative relationships: power, r= –.431, p<.01, goals, r= –.344, p<.01, unemployment, r= –.240, p<.01 and one positive relationship with GDP, r= .213, p< .01. This indicates that marriages and births increase when there are low levels of power (equality and flexibility), there is a life quality orientation over material goods, low unemployment rates, and high economic wealth. GDP had three additional negative correlations with GINI, r= –.315, p< .05, unemployment, r= –.470, p< .01 and power, r= –.594, p< .01. This indicates that when there is economic growth or prosperity, wealth is evenly dispersed amongst societal members, there are low unemployment rates, and the society encourages quality of life over material goods, works together cooperatively, and is open and

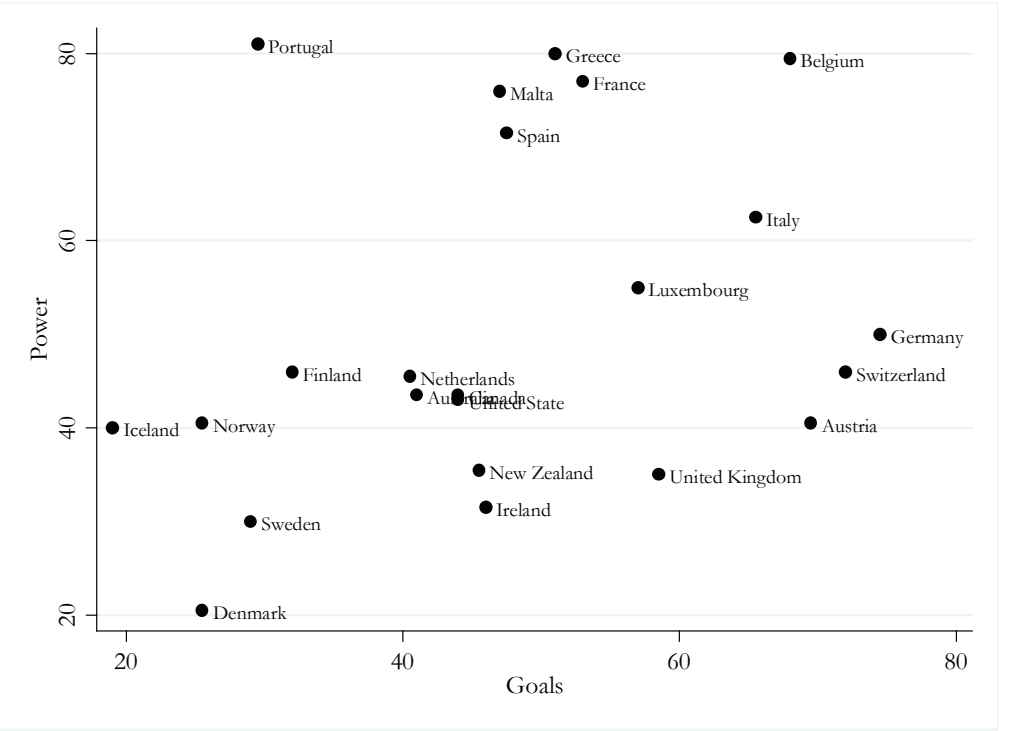


Figure 2: Cultural scores by country
No significant relationship, r=0.289, p< .18

flexible to new ideas. It should be noted that our results are consistent with Okun's Law, which predicts that when GDP decreases unemployment decreases (Okun, 1962; Kaufman, 1988). Additionally, unemployment has a positive relationship with power, r= .479, p< .01. This indicates that, in societies that are hierarchically rigid and practice restraint, there are more unemployed members than when the inverse is true (low unemployment rates when the society is flexible and equal). Figure 3 details an exhaustive correlation matrix and the relationships amongst the variables.

Stepwise Regression

In order to extract the best subset of predictors of mating behavior, a stepwise regression was performed of the mating index on the economic and cultural variables discussed prior. The regression results indicated that the predictors are: power, goals, and GINI, which explained 36.7% of the variance (as shown in Figure 4). At step one of the analysis, power entered into the equation and was significantly related to the mating index F (1, 59) = 16.6, p< .001. At step two of the analysis, power and goals entered into the equation and was significantly related to the mating index F (2, 58) = 11.8, p<. 001. At step three of the analysis power, goals and GINI entered into the equation and was significantly related to the mating index F (3, 57) = 11.1, p< .001. Unemployment and GDP did not enter into the equation at step three (unemployment, t= –1.1, p> .05 and GDP, t= –873. p> .05). The reduced form equation for predicting mating behavior is given in Equation 1:

$$Predicted\ Mating\ Index_{it} = 10.9 - 1.12Power_i - 0.713Goals_i + 17.2GINI_{it} \quad (1)$$

Where i represents the country, and t represents the year.

The most notable aspect of this analysis is the consistency between the exploratory correlation analysis and the regression analysis. There were two negative correlations for power and goals with the mating index and this was consistent in the regression, where both power and goals entered into the equation negatively. Thus, these relationships remain constant after controlling for other factors (holding all else constant). Interestingly, GINI entered into the regression positively at the third stage that indicates that marriage and births increase when there is unequal monetary dispersion amongst societal members.

These numbers show that when the dimension variables, power and goals decrease, marriage and birth rates increase, while as GINI increases marriage and births increase. Therefore, in order for marriages and births to increase, the culture should be socially flexible,

Correlations

		GDP	GINI	Unemployment	MI	Power	Goals
GDP	Pearson Correlation		-.315*	-.470**	.213**	-.594**	
	Sig. (2-tailed)		0.011	0	0	0	
	N		65	272	273	299	
GINI	Pearson Correlation	-.315*					
	Sig. (2-tailed)	0.011					
	N	65					
Unemployment	Pearson Correlation	-.470**			-.240**	.479**	
	Sig. (2-tailed)	0			0	0	
	N	272			246	272	
Mating Index	Pearson Correlation	.213**		-.240**		-.431**	-.344**
	Sig. (2-tailed)	0		0		0	0
	N	273		246		273	273

*. Correlation is significant at the .05 level (2-tailed)
**. Correlation is significant at the .01 level (2-tailed)

Figure 3: *Correlation matrix comprised of cultural, economic and mating index variables Items are compressed when the correlation is insignificant, p > .05.*

open to new ideas, cooperative, unequal access to monetary wealth and focus on the quality of life over the achievement of material goods. However, if the goal is to decrease population the culture should focus on a socially rigid hierarchy with minimal mobility, equal monetary dispersion, restrictive of behavior and focus on material goods. While these variables are independent measures of how culture can impact both marriage and birth rates, taken holistically it depicts a unified concept of what a cultural profile should look like in order to achieve either high or low marriages and births.

Discussion

This study looks at how culturology can be integrated into behaviorology while taking into account socioeconomic variables from evolutionary psychology in order to form a unified representation of the contributing variables to mate selection in a cross–cultural analysis. The results from regression and correlation models show a positive and significant relationship between the Mating Index (MI) and the economic variables. As GDP and GINI increase,

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.469[a]	0.22	0.206	2.03807	
2	.538[b]	0.29	0.265	1.96118	
3	.606[c]	0.367	0.334	1.86745	1.328

a Predictors: (Constant), Comp1
b Predictors: (Constant), Comp1, Comp2
c Predictors: (Constant), Comp1, Comp2, GINI
d Dependent Variable: Mating Index

Figure 4: *Stepwise regression*
This table depicts the contributing variables to the regression model for the mating index

marriages and birth rates also increase. These results do not support Schmitt's findings (2005). Instead, the results suggest that as wealth in the country accrues marriages and births also increase. However in support for the strategic pluralism model, the results show that as GINI increases, meaning that resources are unequally dispersed amongst the members, marriages and birth increase. Similarly, as unemployment rates decrease there is an increase in marriages and births. In combination, Western countries tend to have an increase in marriages and births when societies are flexible, cooperative, indulgent, and rely on traditional and normative values. From an evolutionary perspective, what is being shown is that as resources are in larger supply, and the majority of members have jobs or means to gain limited access to resources and the minority has a surplus, the more children are born through what would be speculated as within monogamous relationships.

The stronger relationships are between the cultural variables and the mating index. In particular, marriages and births increase when there are low scores for both Power and Goals. When Power is low, the country's profile would strive for equal treatment among all members while resisting a singular power or monopoly. Additionally Goals is low, which reflects a culture that dislikes hard and fast rules, allows for a flexible state where innovation is accepted and desired, and tolerates deviations from the norm and traditions. An example of a country that represents a low Power score is Sweden where the culture is normatively relaxed and desires equality. However, a low Goals score indicates that the culture is highly normative and passive which also creates high birth and marriage rates. Interestingly, in contrast to each other, when a culture is either highly normative in their practices or relaxed in their approach to normative behavior there is an increase in mating behavior. This may imply that passivity and normative practices allow for normativity, or cyclical behavior modification, which allows negative reinforcement to have a stronger influence. For example, if having children is the norm members will have children unquestioningly and follow normative rules obediently. The opposing power variable would indicate that if norms are in practice they are loosely followed which increases mating behavior. Sweden follows this cultural prescription that is substantiated by having supportive governmental health care for individuals and/or families. Denmark is a representative country for a low goals score where the country is more passive and normative in practices.

The regression model shows that in combination, a country with a high GINI that is passive, normative, equal and relaxed toward the future is associated with high marriages and births. While this cannot be a direct predictor of how to either increase or decrease mating behavior among a country's members, it does depict certain trends worth investigating further.

As Skinner pointed out (1953, 1974) the main objective of science is prediction and control, as it is with control that we can use science for the improvement and betterment of society. Of course, in culturology, what constitutes a "good culture" is somewhat hard to define and the definitions are based on individual reinforcement histories as well as the rules under which they might currently operate. When attempting to design culture, which culture should one seek to emulate? Is it the Danish passive and normative practices, or perhaps the Mexicans who espouse optimism and relaxed attitudes? (For a more detailed account of each country's standing, refer to Figure 2.) If one chooses the Danish way, the first step to cultural design would be to investigate in more detail the contingencies that operate in that culture. For example, if passivism is to be espoused in the designed culture what, in what way and how, does Danish culture espouse that behavior? How is aggression and non–passive behavior treated? In general, the Nordic countries have a very non–aggressive policy regarding violent crimes and offenders (i.e. short prison sentences, therapy in lieu of prison time), which might play a role in the passive attitudes. Of course, these non–aggressive policies could also represent the culture, but without experimentation it would be difficult to ascertain anything about the possible causal chain.

As useful as the Hofstede dimensions are, they are only verbal self–reports of perceived rules, not of enacted rules or actual behavior. It might well be that people profess tolerance, for example, but do not display that tolerance in action. A more objective measure of cultural practices therefore needs to be developed, if only to assess the possible differences between stated and enacted values and to tailor cultural interventions based on these differences.

In summation, richer cultures, with unequal dispersion among the members, and with either highly normative, and passive or relaxed attitudes towards deviations from the norm, are highly likely to have higher than average rates of births and marriages. While these trends may reflect the pillars that should be in place in order to create this effect, it should also be noted that these pillars are in place due to repetitious, in–group monitoring of behavior in order to create these cultural practices. Therefore while group behavior is dynamic, it is also highly structured. More specifically, repetition breeds normative practices, and these create trends that can be examined statistically to try to explain high or low birth and marriage rates.☘

References

Dawkins, R. (1984). Replicators, consequences, and displacement activities. Peer commentary for (B. F. Skinner) Selection by Consequences in: *The Behavioral and Brain Sciences, 7,* 486–487.

Delprado, D. J., & Midgley, B. D. (1992). Some fundamentals of B. F. Skinner's behaviorism. *American Psychologist, 47* (11), 1507–1520.

Dennett, D. (1978). *Brainstorms.* Boston: M.I.T. Press.

Donahoe, J. (2012). Reflections on behavior analysis and evolutionary biology. *Journal of the Experimental Analysis of Behavior, 97,* 249–260.

Donahoe, J. W., & Palmer, D. C. (1994/2010). *Learning and Complex Behavior.* Boston: Allyn & Bacon.

Hill, S. E., Rodeheffer, C. D., Griskevicius, V., Durante, K., & White, A. E. (2012). Boosting beauty in an economic decline: Mating, spending, and the lipstick effect. *Journal of Personality and Social Psychology*, *103* (2), 275.

Glenn, S. S., (1988). Contingencies and metacontingencies: Towards a synthesis of behavior analysis and cultural materialism. *The Behavior Analyst, 11* (2), 161–179.

Glenn, S. S. (2004). Individual behavior, culture, and social change. *The Behavior Analyst, 27* (2), 133–151.

Hofstede, G. (2012). *The Hofstede Center*. Retrieved from: http://geert-hofstede.com/

Hull, D. L., Langman, R. E., & Glenn, S. S. (2001). A general account of selection: Biology, immunology, and behavior. *Behavioral and Brain Sciences, 24,* 511–573.

Ledoux, S. F. (2014). *Running Out of Time—Introducing Behaviorology to Help Solve Global Problems.* Ottawa, Ontario, Canada: BehaveTech Publishing.

McGregor, R. (2011). Five myths about the Chinese Communist Party. *Foreign Policy.* Retrieved from http://www.foreignpolicy.com/articles/2011/01/02/5_myths_about_the_chinese_communist_party

Okun, A. M. (1962). "Potential GNP: Its Measurement and Significance." Reprinted as Cowles Foundation Paper 190. http://cowles.econ.yale.edu/P/cp/p01b/p0190.pdf

Pennypacker, H. S. (1992). Is behavior analysis undergoing selection by consequences? *American Psychologist, 47* (11), 1491–1498.

Pinker, S. (2012). The False Allure of Group Selection. *Edge.org.* Retrieved from http://edge.org/conversation/the-false-allure-of-group-selection [Interested readers are encouraged to read both Pinker's arguments against group selection, as well as the commentaries posted on this site.]

Schmitt, D. P. (2005). Sociosexuality from Argentina to Zimbabwe: A 48–nation study of sex, culture, and strategies of human mating. *Behavioral and Brain Sciences*, *28* (2), 247–275.

Skinner, B. F. (1953). *Science and Human Behavior.* New York: Macmillan.

Skinner, B. F. (1974). *About Behaviorism.* New York: Knopf.

Wilson, D. S., Van Vugt, M., & O'Gorman, R. (2008). Multilevel selection theory and major evolutionary transitions. *Current Directions in Psychological Science, 17* (1), 6–9.

Wilson, D. S. & Wilson, E. O. (2007). Rethinking the theoretical foundation of sociobiology. *The Quarterly Review of Biology, 82* (4), 327–348.

Appendix 1: Variable source list ☙

Variable	Source	Website
GDP	Economy Database	https://www.conference-board.org/data/economydatabase/
Unemployment	Index Mundi	IndexMundi.com
GINI	World Bank	worldbank.org
Sex Ratio	CIA Factbook	https://www.cia.gov/library/publications/the-world-factbook/
Birth Rate	Index Mundi	IndexMundi.com
Marriage Rate	Destatis	destatis.com
Culture	Hofstede	http://geert-hofstede.com/index.php

Submission Guidelines

Journal of Behaviorology **(previously known as *Behaviorology Today*) is the fully peer–reviewed Journal of TIBI *(The International Behaviorology Institute)* and is published in the spring and fall of each year.**

To submit items, **contact the Editor (Volumes *18, 19, 20*):**
Dr. James O'Heare
Companion Animal Sciences Institute
1333 Rainbow Crescent
Ottawa Ontario K1J 8E3
CANADA
Phone: (613) 297–0153
E–mail: jamesoheare@gmail.com

Considerations

The Journal entertains experimental or applied research papers and theoretical or conceptual or literature review articles (all of which will have at least three reviewers) as well as book reviews, on terms, in response, and program descriptions (two reviewers) plus letters, memorials, etc. The members of the TIBI Board of Directors constitute the basic Editorial Review Board (ERB) on which others can serve as members or guests. Authors will not be identified to reviewers and reviewers will not be identified to authors, except when they opt to sign their reviews. (Some reviewers prefer to sign, usually in acknowledgement of the additional assistance that they are prepared to offer the author.) Each reviewer will provide constructive feedback as well as a recommendation: accept, or accept with revisions, or revise and resubmit, or reject.

Based on the set of reviewer recommendations and comments, the Editor will convey the feedback and summary decision to the author(s). With assistance from members of the ERB, the Editor will also provide authors with guidance to shape the best manuscripts possible in a reasonable time frame.

All accepted pieces must contribute to the behaviorology discipline (e.g., by relating to or clarifying or expanding some part of the discipline such as the philosophical, conceptual, theoretical, experimental, applied, or interdisciplinary aspects). Accepted pieces must also be crafted in ways that convey as much consistency as possible with the principles, concepts, practices, philosophy, and terminology of the discipline.

Research paper authors (a) must obtain any necessary permissions or approvals from the Human–Subjects Review Committee of their affiliated campus or agency, and (b) must comply with the usual ethical standards relating to all research and experimental subjects. All authors are required to disclose for publication any possible conflicts of interest. Also, congruent with past practice, exclusions of important or relevant content for length reduction will be resisted as much as possible.

Mechanics

Authors are encouraged to contact the editor to discuss their manuscript prior to submission to answer questions and clarify procedures and processes. Initially, a paper should be submitted to the editor by email as a PDF attachment.

The email will contain a cover letter. This letter should describe the article, and the work or history behind it, and will include the author name(s), affiliation(s), addresses, phone numbers, paper title, footnotes (e.g., acknowledgements, disclosures, and email or other contact information for publication) as well as comprehensive contact information on up to six suggestions for possible reviewers.

The PDF document (a) should have *only* the author's name in the file name (which the Editor will record with the assigned manuscript number while replacing the name *with* the number in the file name before sending the manuscript PDF file out to reviewers), (b) should *use the standard style exemplified by papers in past issues* of the journal (as TIBI is unconnected with any particular, formal "style"), and (c) should be set in 12 point type on 24 point leading (i.e., double spaced) with 1.25 inch side margins and 0.75 inch top and bottom margins, excluding the title header and page–number footer (i.e., all text parts of the piece—including tables, figures, photos, etc.—fit in text blocks that are 6.0 inches wide and 9.5 inches tall, with the title header just above this block and the page–number footer just below this block). These measurements are for US letter size paper; for other paper sizes, the text block size and top margin remain the same while the other margins will change as needed. The text parts of the paper start with the title, then an abstract, and a list of "Key Words" for indexing purposes, followed by the body of the piece plus references and figures or tables. Work all footnote material into the text. Upon acceptance, papers should be provided to the editor as a Word–format document along with a new PDF of the Word file (to verify the accuracy of content transfers during page–layout operations).

Note: Authors' views need not coincide with official positions of TIBI, and authors retain copyrights.

What is Reality to an Organic Unit of Matter? Some Physics of Behavior with Implications for Sentience and Sociality

Lawrence E. Fraley*

West Virginia University—Morgantown (retired)

Abstract: We behaviorologists classify ourselves professionally as "natural" scientists. Nevertheless, some of us are conditioned to experience aversive emotional reactions to the strict regard of ourselves as naturally occurring products, and not all of us accept with equanimity all of the implications of that status. Although we scientists of nature have dismissed many of the culturally implanted superstitions that otherwise would clutter our objectivity, our prevailing constructs of reality remain laced with some of the more tenaciously resistant yet mistaken assumptions that characterize traditional human culture. However, with resort to some simple principles as those false assumptions are coming under renewed scrutiny, that culturally conditioned veil of misconceptions dispels rather straightforwardly.

To be effective in their fields of study, scientists must be skilled manipulators of the variables that define their respective specializations. As illustrated in this document, they may also find helpful at least a rudimental facility with the essential principles of neighboring scientific fields, the borders with which, at times, their interests may lead them to step briefly if tentatively across.

Pursued herein are some implications of the natural status that "human beings" share with everything else in the universe. We natural scientists have long been saying that human beings are a product of *natural* processes, and most of us have rejected notions of human beings as mini–deities. However, given a philosophy of naturalism that requires *all* of our characteristics, including our so–called sentience, to have arisen naturally and to operate via naturally occurring processes, such a perspective imposes some further implications that, otherwise salient, often remain obscured in the cultural fog.

The Traditional Perspective

This discussion begins at the current stage of the ongoing trend to "get natural"[1‡] about ourselves. Natural scientists have come to assume, in general, that we human beings, as units of organic matter, although of complex and intricate structure, nevertheless possess no supernatural capability in elevation of our status above that of other "chunks of matter" (such as rocks, for example). In comparison to the rocks upon which we trod, neither they nor we can somehow transcend naturalness. But we, as an organic type of material entity, differ from our rocky relatives in certain natural ways that broaden our capabilities beyond their limits.

As traditionally construed a material entity, upon occasions of change in the flow of energy to it or from it, mediates process. Life connotes natural processes, which renders "life" a term of status for the material entity under consideration. To be "alive" means that the relevant processes are occurring within the appropriately energized material entity. Given the necessary inputs of energy, the processes of life, including behavior, are enabled if the structures that mediate them have the necessary intricacy and complexity to so respond to such flows of energy. That is all that is required for a material entity to be life–capable.

Adding a cultural endowment of agential spirituality, whether theological (as with souls) or secular (as with agential selves, sometimes called psyches, minds, etc.) merely laces this status with redundant conceptual accouterments. Some contemporary individuals, widely recognized as intellectually sophisticated and educationally well credentialed, resort to a mystical account, but in many cases only for an ancient[2] beginning, and then allow that thereafter nature took and continues to follow its own course.

However, even among people generally accepted as strict naturalists, some individuals nevertheless may exempt themselves from the principles of naturalism by substituting ongoing bodily control by a fictitious and

‡ Footnotes include references, and appear at the end.

*Address correspondence regarding this article to lfraley@citlink.net.

Key words: behaviorology, environment, physics, reality, robotics

mysterious personal agent for the alternative account provided by the natural sciences including *behaviorology*. Today we note that most contemporary scientists, if they enjoy well–rounded educations, no longer adhere to the more simplistic notion of human beings behaving under the strict managerial control of one or more remote, supernatural, and typically powerful deities. Yet many of those same intellectually sophisticated scientists, in perhaps the ultimate anthropomorphic exercise, still rely on a similarly mystical mini–deity, variously called "I" and "me," to act as a somewhat autonomous self–agent and manage a human body from within, especially its operant behavioral activity.

Thus, although most scientifically informed people concede, in general, that the world operates naturally, historically many of them have encountered difficulty in applying that assumption to their own species and to themselves in particular. Even most of those who from an early age were spared the prevalent and intense cultural indoctrination in mysticism, nevertheless have suffered enough culturally guided misdirection of their developing intellects to entertain seriously their own implicit endowment with mystical personal powers. They assume themselves possessed of sufficient mystical capacity for what respectively seems to them like the conjuring of their own behaviors at the behest of a personal internal agent that each regards as his or her intrinsic and somewhat autonomous self (whatever one of those could be).[3]

Language has evolved to reflect this common reliance on such mystical mini–deities. While in the linguistic practices of sophisticated naturalists, "I" is merely a term of locus with no "intended" implication of mysterious causality, in the linguistic habits of most speakers and writers, pronouns (I, you, he, she, etc.), in addition to innocuously indicating the mere location of behavioral events, often imply a fictitious behavior–controlling inner agent. But in a literally rendered statement of that latter kind such as, *"I decided to run,"* what exactly is an "I"?

The emergence of an answer to that question can begin by applying to the putative "self" (a.k.a. "I" or "me") what natural scientists have long been assuming, in general, about everything else that they encounter: Even if such things were real, regardless of the nature of "I"s, they would neither exists as, nor be operated by, a supernatural essence with a capacity for mystical spontaneity. That exclusion is based on some general scientifically supported philosophical assumptions, namely: (a) that any real event is driven by changes in incoming or outgoing energy, thus precluding its spontaneity, (b) that it occurs in functional relation to its antecedents, and (c) that, in general, a valid account for such a natural event will be entirely independent of unnatural factors. Because these propositions leave no place in a continuous functional chain for the intrusion of a mystical source, an agential self is precluded.

Over the past 100 years, a natural science now called behaviorology has evolved to develop a scientific foundation for what people commonly call "motivation."[4] Behaviorology is a *natural* science according to which all behavioral events must occur "for a reality–based reason" (as they say, and about which quantum physicists could say much more). From the behaviorological perspective on a natural science of behavior–controlling relations, the adjective "natural" connotes that *any* behavioral event, whether exhibited neuro–muscularly (e.g., an elbow bend) or only neurally (e.g., a thought), is functionally controlled (i.e., determined) by measurable and thus "real" environmental variables. Note, too, as we will further explore, that an "environment" is defined by the neural behavioral awareness and subsequent contemplation that putatively is "*of* it."[5] This conclusion, here reached and to be further explored in this work via a behaviorological analysis, can also be attained via analyses pursued within other natural sciences.[6]

Although neural behavior is just another class of occurring behavioral activity that certain body parts have the structure to exhibit, neural behavior was easily misconstrued throughout human history. Wrongly accepted as operational evidence of a mystical agential self at work, neural behavioral process was widely misinterpreted as the activity of a proactive self–spirit. The evolution of the language by which people commonly describe these neural behavioral processes has occurred in adaptation to the prevailing traditional assumption of such a fictitious personal self–agent residing managerially in the midst of all such behavioral activity.

Thus arose among humans the troublesome and fictitious concept of agential sentience, first, presumably, as the mere manifestation of a mystical, internal, self–agent, and subsequently as the various managerial activities of that mystical agent along with the many misleading implications that derive from such assumptions. The invalid account (of the nature of a person) being described here has become an interwoven component of human culture, and most peoples' lives transpire entirely within the bubble of that fiction. However, pursuing the apparent implications of an unknowingly fictional account of complex practicality remains subject to multiplicative error. Confusion seems to characterize nearly every step and, in their typically abortive quest to sort through it, many people have surrendered to despair.

From the perspective of *traditional* natural science, the "environment" consists of remote sets of behavior–controlling variables from which the control of behavior is presumably "exerted." Such behavior–controlling relations have been so thoroughly and comprehensively

studied from the traditional perspective on reality that in technical contexts any further explanatory reliance on mystical self–agency has come to be regarded as an irrational redundancy by behaviorologists in particular and by many others within the broadly construed natural science community. For most natural scientists, as a result of that history of investigation, a traceable physical link is now widely presumed to exist, without exception, between *any* specific behavioral event and the putatively remote environment (that, upon closer consideration, it actually establishes). Any such links not yet objectively verified are assimilated as assumptions into a general philosophical extrapolation from *verified* naturalistic instances to *all* naturalistic instances. People who display a tendency to exhibit that kind of conceptual leap are deemed to be naturalists in a somewhat abstract if perhaps more valid sense of that term.[7]

According to common interpretation, those environmental features that control, or share in controlling a specific behavioral response can be located either within the behaving body (the endovironment), outside of it (the ectovironment), or both.[8] However, from the traditional perspective, a behavior–controlling "independent" variable that lies within the body nevertheless tends to lie external to the behaving body part.[9] An example would be the awareness of a pain in one's left knee (stimulus in the knee; neural response by some parts of the brain). The separation of stimulus and behaving body part may seem confounded in the case of the flexion of a knee in response to a pain in that joint, although a physiologist could argue that the sensation of pain occurs in the brain and is only interpreted to be in the knee, and that that neural sensation of pain then stimulates the flexion of the knee. In many other cases, the stimulus may be entirely outside of the body (in the ectovironment), as when a distant aircraft evokes the elevation of an arm with the point of a finger in its direction.

In all such stimulus–response relations, regardless of the location of a stimulus relative to the behaving body part, *from the traditional perspective of scientific objectivity,* a flow of energy can be traced *from* the relevant environmental variable or factor (called the stimulus) *to* the behaving body part. And again from that traditional perspective, behavior by a body part can occur *only* in reaction to the arrival of such an incoming energy flow from someplace in the environment of that behaving body part. The environmental feature from which that energy putatively arrives and which is therefore called the *stimulus*, is said to "exert control," via that energy stream, over the behavioral response that then occurs presumably in reaction to that incoming energy.[10]

In more common language, the statement that "everything happens for a reason" typically alludes, in general, to the effects of forces being exerted when the energy status of matter undergoes change. Such energy transfers "make events occur," as they say. Behavior is never an exception; a behavioral response is just one such kind of event that, from the traditional perspective, can occur when energy, of appropriate quantity and kind, is flowing to a body part having (a) the necessary structure to mediate behavioral events and (b) access to an appropriate store of required potential energy. While behaviorologists, who depend on reliable correlations between environmental and behavioral variables, need not be concerned with actual traces of such energy flows to complete their correlation–based behaviorological accounts, those underlying energy transfers always exist as a necessary aspect of behavioral events.[11]

Shifting the level of analysis from the correlations of behaviorology to the physics of physiology, *and* continuing to speak from the traditional perspective on reality: Such energy streams are deemed to be "real" insofar as they are detectable and measurable. Furthermore, beyond mere correlation between stimulus and response, an explication that is thus cast in terms of the physics of behavior shifts the stimulus/response relation from coincidental toward functionally causal and thus lends a further air of reality to any stimulus/response relation to which it pertains.

Such an energy stream, during the conceived journey from environmental stimulus to a body part that it stimulates to behave, is presumed to retain, in some orderly way, a unique "representation" of the stimulus, insofar as a manifestation of order in the set of stimulus characteristics will be followed by the manifestation of a *particular* order in the related set of behavioral responses by that stimulated body–part. Alluding to that preservation of order from *stimulus–to energy stream–to behavioral response*, the response in such a specific relation, which we say is "evoked" by the stimulus, is thus enabled to be what we call "discriminative" with respect to that particular stimulus. Thus, the order–preserving energy, upon flowing from an environmental feature to an appropriate bodily structure that through appropriate conditioning has been rendered discriminatively behavior–capable, evokes responding that presumably reflects the character of the environmental stimulus. That is, upon arriving at the appropriately sensitive body part with a sufficient amount of its environmentally arranged order intact, that flow of energy stimulates a response that somehow reflects or corresponds to that surviving order.

From the traditional scientific perspective, the *initial* state of an energy stream as it leaves an environmental stimulus, and its *final* state as it triggers a body–part to behave, may differ in intensity and form. Yet, as traditionally assumed, some order in the initial state of that energy stream will result in a corresponding order in

the manifestation of the final behavioral activity. Reliance on that conservation of order in the stimulus–to–behavior relation has allowed us to say, scientifically and from the traditional perspective, that, in general, a behavior by a given body part occurs "as a function of," or "in functional relation to," a specific environmental factor, or configuration of factors, (or *stimulus*, as collectively we call it) from which, analytically, we traditionally began the forward trace of the relevant energy flow. Thus, the familiar scientific concept of function, upon its emergence, became available to underpin the deductive leap to the basic assumption in physicism (or materialism)—namely, that *everything* in the universe, process or entity, including behavioral phenomena, can be ascribed to physical or material causes. The phrase *functional relation* has thus come implicitly to categorize the involved environmental stimulus as "real" in accordance with the traditional philosophy of naturalism.

From the traditional perspective on reality, the energy in the kind of stream being discussed here, as presumably it emanates or reflects from a stimulus, is conserved after its departure from that stimulus (i.e., relative to its former referents, all of the energy remains extant),[12] although along its course of travel, to a behavior–mediating body part, some of the energy in such a stream might disperse away from the stream of interest. Furthermore, the energy that remains a part of the stream of interest can undergo respective transformations when it interacts with each successive transmission medium. Consider, for example, sunlight impinging on a tin roof, which is thereby heated causing molecules of its paint–coated undersurface to vaporize. Some of those energized molecules then reach the nose of a person below. Their energy then triggers the various chemical reactions involved in nervous transmission to the part or parts of the brain that have been conditioned to familiarity with that odor. Then, along with the additional arrival of a different energy stream from a nearby companion, the arriving olfactory energy stream contributively adds to an energy composite that then stimulates the vocal announcement to that companion that "the sun must be shining."

When and where an energy stream manifests via behavioral "detection" requires an appropriate sensory mode (e.g., audition, vision, taction, olfaction, etc.) for that time and place along the putative course and existence of that energy stream. Such postulated events, which link what we call the "external realm" to the internal realm in the traditionally popular conception, establish what from the traditional perspective are regarded as the logically necessary environmental precursors for any resulting behavioral responses including any relevant basic awareness behavior. However, from the internalized perspective, awareness behavior *is* the starting point for "sentience" (as will later be explored in more detail).

But from the *traditional* perspective, a response that preserves the transmitted order of the energy stream evocatively emerges from the set of potentially available alternatives known as the *operant*. The particular *formal* mode of that occurring orderly response presumably is determined by the current configuration of the responsively sensitive neural bodily structures at which that energy flow has arrived. That formal structure of the behaving body part is a joint product of both the biological evolution of the species and the microrestructuring produced by the conditioning processes that previously were focused on the relevant microstructures within the nervous system of that individual organism.[13]

This discussion involving energy transfer has pointed to, and relied upon, some elementary classical physics that naturalistic assumptions demand for the expansion of a mere correlation into what is said to be a "functionally causal" relation between an environmental stimulus and a behaving body–part.

Continuing with the traditional perspective on reality: Along the course of such an energy flow from environment to behaving body–part, although some of the order imparted to that energy stream by the stimulus from which it flows may be conserved, losses and formal transformations may occur to the energy stream. If what is left of such an energy stream as it arrives at the relevant behavior–capable body can no longer evoke a specific and well–defined response, a somewhat poorly defined behavioral approximation may occur. If so, such a response may be described as vague or, more agentially, as "having been rendered tentatively with ambivalence."

On the other hand, amplifications occurring someplace along the energy stream of interest may boost its energy level just as dissipations may diminish it. After all, behavioral activity typically requires more energy, and invariably a different form of energy, than presumably begins traveling from an environmental stimulus in a typical, relatively feeble, behavior triggering, energy stream—true even for mere thought that pertains to the stimulus (recall your grade school biology teacher's emphasis on the high energy demand for brain activity). The energy stream that eventually stimulates a behavioral manifestation (of whatever kind) therefore typically requires some amplification[14] by the recipient body for the stimulated behavior to occur. Thus, for example, only with the bodily addition of supplementary energy can a feeble stream of incoming light reflected from a switch on a wall trigger (i.e., "stimulate," or "evoke") the movement of a relatively heavy arm and hand as it reaches toward that light switch. A trace of such an energy supplement, added by the body, carries back through the general process of bodily nutrition.[15]

However, after the stimulating energy, arriving from the environment, impinges on a behavior–capable

organic body, it is the physiologists who must explicate the detailed intricacies of both (a) behavioral stimulation *within* the body and (b) the nutritional processes for the necessary energy supplementation. Note that the completion of such more encompassing accounts, even at this elementary level, may imply overlaps of interest between behaviorologists and physiologists. However, both behaviorologists and neural physiologists can operate independently at their own respectively differing levels of analysis without over–the–fence forays into the pastures of their scientific neighbors. Nevertheless, an occasional cross–boarder peek can afford qualitative and interpretive advantages in certain aspects of the work in each of those fields.[16]

Now, to reconsider more closely what on earth has or has not evolved to behave, we note that one major class of matter is "inorganic" (e.g., rocks and minerals) and another major class is "organic" (e.g., animals and plants). The inorganic kinds, apart from robots, do not behave, while some varieties of the organic kind do so.[17] Note that, in general, those two major classes of matter differ in their natural structural complexity. The organic kind tends to exhibit a more complex and intricate structure than the inorganic varieties. Therefore a more diverse reactivity can be anticipated from the more intricately structured organic kinds of matter. While not all organic structures can exhibit behavior, in some such cases even that extreme is possible.

Changing the Perspective

Let us next consider what we have been regarding as an environment–stimulated behavioral event, but in this case we will consider it from the *intrinsic* perspective of a unit of organic matter that is appropriately structured for behavioral activity. Note, in the first place, that a status of "environmental stimulus" is attained through a process that *begins* with a behavioral event called a "sensation." From the intrinsically isolated perspective of a unit of organized matter known as a "behaving organism," that initial behavioral event occurs *presumably* as a response to a flow of energy that has arrived from some environmental feature to impinge on that behavior–capable organic piece of intricately structured matter. That logically presumed source is then designated as a "stimulus" *for* that behavioral event. That occurring behavior thus acquires the traditional status of "response *to* that stimulus." Note, as we shall proceed to explore, that what is being called the "response *to* an environmental stimulus" occurs in the mode of neural behaviors that circularly serve as a neurally behaved construct that *is* the logically presumed environmental source.

Presumably, as traditionally construed, a flow of energy has streamed, with its acquired unique organization, from an environmental locus to impinge on an organic body–part that possesses the microstructural capacity to "sense" it—that is, to behave neurally a raw or basic awareness, which, with subsequent chaining partly determined by appropriate preconditioning, is then presumed to be an awareness "*of*" that environmental feature. As the prevailing presumption goes, any such incoming burst of energy may initiate a chain of neural behaving, but although it is rarely noticed, from the intrinsic perspective of a human unit of organic matter, that chain of events *begins* with a basic sensation or raw awareness. Certain of the ***subsequent*** neural behavioral responses, all presumably *to* that putatively impinging energy, thus *become* the unique "identity" of what is then retro–regarded *as* the particular "environmental stimulus" that presumably organized that implicitly incoming energy stream. Starting from our neural sensation behaviors, those sensations tend quickly to chain to environmental constructs that occur in neural behavioral mode and then conceptually project to an externality, all of which continues to occur in *internal neural behavioral* mode. Inhering exclusively as but an aspect of its own neural behaving, an "individual" cannot, and hence never does, get out of "itself" as if it were a material feature of its own environment. That perspective from a remote vantage point, whereby one appreciates one's occupation of one's own "environment," represents a view that relies on a fundamental mistake about the nature of environments per se.

Note that the "environment" manifests exclusively in neural behavioral mode as assumptions that *follow* initial awareness events. Importantly, we are but energized pieces of matter. Our behavioral processes occur exclusively within us and to us. Therefore, everything in this sequence of chained behavioral events has occurred within the organism. What we call an "environment" consists of some internal interpretive neural behaving that occurs exclusively in the mode of post–awareness, neural–behavioral process and thus occurs internally.[18] That of which we are said to be "aware" occurs in the mode of a conceptual construct that chains *from* (i.e., follows) the awareness behavior that we then circularly regard as being "of it."

In such chains of events we must recognize, from the internal perspective, the event to which primacy must be assigned. Given a presumed piece of organic matter to which this chain of events is occurring, note that awareness behavior (a.k.a. a "sensation") is the *first* thing that occurs in such a sequence. The existence and uniqueness of the *putative* incoming energy flow, as well as the "environmental" stimulus from which it presumably streams, *inhere in the neural behavioral responses that subsequently chain* ***from*** *those initial awareness responses. That is, the environment inheres, as a conceptual construct, in the kind of subsequently chaining neural behaviors that are generally regarded as "environmental qualities."*

Such chaining neural behaviors, as they internally establish an environment, can be classed as "presumptive recognitions." But note that all such neural behavioral activity stems ***from*** *the initial awareness behavior.* That is all that *can* occur to a unit of organic matter on such an occasion. That the behaving entity is relating "**re**actively" to a presumably remote environment is a further neural behavioral attribution that derives, in part, from the internal stimulation of preconditioned logic.[19]

Both the "environment" and how it functions thus emerge as behavioral attributions in the form of assumptive behaviors that chain *from* initial sensations or "awareness" behaviors. *That is, the post–sensation, neural–behavioral construct of environment is conceptually projected by way of an externalization that perspectively shifts the neural behavioral construct of "environment" to its putative remoteness from the ongoing neural behavior that such a conceptually projected environment is then said "to have stimulated."* That exercise in circular logic, nearly universal and satisfying to most of the people who indulge in it, nevertheless strips an environment of its actual nature by imposing a comfortably false one. Environmental matter and material substance manifest only in the mode of neural behavior as "building" material for a behaved environmental construct, the external reality of which cannot be established from within the composite of that behaving.

Note that we tend to rely on that internal, neurally situated, environmentally ethereal, projection, which exists only as internal neural behavioral process, to stimulate our bodies to further behave as if that "environment" is "really out there" doing environmental things *to* our behaving bodies. The environment to which we units of organic matter attribute behavioral stimulation is thus but a conceptual contrivance that emerges in the form of neural behavioral process *within* the *internal* chain of neural behavior that, via circular logic, is then said to have been stimulated "by" that "environment" (which is only *conceptually projected* to be "out there"). That "logical" conclusion about stimulation, although a fallacy, induces a behaviorally constructed "external reality" for what is actually one's internally behaved world.

For a neurally behaving body part that is undergoing basic awareness activity, the behavior–stimulating environment remains a natural product of *subsequently* chaining neural behaving (of the kind that somewhat misleadingly is often called "recognition"). As mere pieces of matter, we *behave* our environments, which occur within us in the mode of our own neural behavior. Sentience thus emerges as a more limited or constrained process than traditionally supposed, insofar as both consciousness and any subsequently related scientific objectivity to which it may chain occur *within* units of matter possessed of the necessary structural intricacy to exhibit those qualities in the mode of neural–behavioral process.

The *possibility* of a traditionally presumed environment, remote from the behaving body, is not precluded, but an organic piece of matter cannot transcend its behavioral immurement so as to establish a direct contact with it. This simulates the paradox of parallel universes: first, an internal universe that inheres exclusively as behavioral manifestations, and second, a hypothetical external, material counterpart with which the concept of "direct contact" is meaningless insofar as we are merely behaving it. Stimulation of behavior *by a remote environment* that cannot be established reduces to just one aspect of a *totally behaved logical construct* that is only *conceptually* projected to its externality in the mode of more neural behavior. The material entities of which environments are putatively composed lose their reality to this revelation.

"We" exist only in internal behavioral process mode, and not as entities that from within our bodies can "utilize sensory windows" to appreciate an outside realm. Note, importantly, that the conceptual activity that creates a *traditionally conceived "environment"* does so in a way requiring a reversal that we cannot accept as possible: It requires some behavior (the neurally behaved "environment") to have stimulated itself from a remote location to which it is only conceptually projected. The traditional *environment* is thus left as a neural–behavioral, inference–class, rationalized construct occurring in the mode of neural behavioral process *within* what is presumed to be a unit of naturally organized matter.

This revelation applies also to the neural endovironment. When the point is made that the external reality of a "remote" tree actually inheres in some ongoing internal neural behavior, so must the neural apparatuses upon which we are relying for such an account (brains, nerves, neural energy flows, etc.). Those things, too, being as "environmental" as that "remote tree," come into existence only in neural behavioral mode as parts of one's logical "environmental" construct. All matter is behaved into its ethereal "existence."

As substantive reality yields to the progress of this argument, the aspects of environmental reality vanish accordingly. The reality of substantive material and of its processes, upon which traditionally we have relied throughout human history to anchor our logic, disappears rather like the substance of a Cheshire cat. We are left with no reality established, because traditional reality is not establishable. The idea of "being sentient" has a logical flaw insofar as nothing real can be established (invested with reality) to *be* sentient. That is, nothing (no environmental entity) can be established (endowed with a material reality) to appreciate its own putative domain as a realm that stands apart from the

neural behavioral processes *of* which it is constituted. Like those limestone driveway pebbles that we behave into a tenuous "existence," we behave ourselves as units of organic matter, the independent reality of which, like any other environmental aspect, cannot be established.

Thus, the stuff of what traditionally we call our "environment," as best we intrinsically isolated "matter–chunks" can account for it and "establish" it, consists of but chaining neural behavioral *process* the control of which is shared in part by (a) the awareness behaviors from which the putative chaining begins and (b) the relevant logical propositions, which, per se, manifest merely as some additionally chaining neural behavioral process. Thus, in one sense we organic units of matter are as trapped within ourselves as are the pieces of limestone gravel on our driveways. But in another sense, neither they nor we can qualify as a self–entity that is trapped, because, for the same reasons, there is nothing in either gravels or people that could become "trapped." There is only process, and depending on the structural configurations upon which energy is said to be impinging, either process occurs or it does not occur. Apart from that occurrence of process nothing exists to qualify as extant. (Recall from early science classes the old illustrative question: Where are elbow bends stored until needed by the elbow? …'Meant, in traditional logic, to reveal how a conundrum can be spawned by confounding a process and a material entity).

The externality of our environments inheres in neural behavioral mode as one aspect of a natural conceptual construct. Said more elaborately: as organic entities, some of our presumed, structure–enabled, internal activity manifests, in a neural behavioral mode, as an external universe in which we presume further to be operating. Any further confirming tests relevant to the "reality" of such a universe, some of which may occur as logical resolutions, all manifest in the mode of more behavior. When what we regard as a tree in the front yard meets such "tests" of its "really being out there," that is as close to the establishment of that tree's place in a putatively real external environment as an insular organic unit of matter can effect. But the establishing of that tree via direct sensory confirmations as well as logical resolutions that confirm its environmental reality *occurs entirely*, and *only*, in the mode of internal neural–behavioral process as logically respectful ethereal projections by internal parts of the "appreciative" organism. Environments are produced in the mode of neural behavioral activity by internal structure possessed of the intricate complexity to exhibit appropriate neural behavioral process in relevant ways.

In summary, our respective environments are *behaved*, as are the subsequent chains that traditionally are regarded as our "reactions *to*" the particulars of our respective environments. Also behaved are our accounts of how an environment produces subsequent behavior. According to the behaved logic by which we "make relational sense" of such matters, all of this interrelated neural behavior is functionally linked together via chaining. Any link in such a chain, or interconnection of chains, can be traced back to the class of neural behaving called "sensations."[20] Thus, our so–called "external environments," consisting of our attributive endowments of such sensations with causal externality, consist of neural behaviors that chain internally *from* sensory behaviors, which seem to be primal relative to any behavior occurring within the self–contained organism.

Thus, to appreciate one's own environment is not to "establish contact with a remote realm," but internally to behave that realm. For each organism, the materials or substances of its environment occur only in neural behavioral process mode. Thus, a rock in the path ahead manifests as the occurrence of a neural behavioral event rather than as a material entity of traditional regard. Reactions to such events can then follow, putatively as further chaining. Presumably, such a complete sequence of chained reactions extends from initial raw sensations to ultimate contemplations. From certain particulars of that sequential behavioral process the construct of "environment" acquires what one typically regards as its "reality." This perspective, cast with the limitations of internality, derives as a residual implication of our having rejected invalid notions of our status including its characterization in terms of supernatural self–powers. All surviving, natural, internal activity remains subject to more intricate explication at the analytical level of each relevant natural science.

The bodily locus and nature of any instance of our primary *chain–initiating* neural behavioral activity, which traditionally we *infer* to have been "to" a neurally behaved "remote stimulus," determines our attribution of its detection mode. For instance, if such an initial behavioral reaction involves a *visual* awareness type of neural behavior, we, given appropriate conditioning and shaping,[21] react *inferentially* as if having "seen" it, attributing that event to an "energy stream" presumably arriving via our eyes in the form of what we construe to be electromagnetic radiation.

Furthermore, (again, with appropriate conditioning and shaping) we refer to the particular kind of order presumably conveyed *in* such an energy stream but actually manifesting in the mode of our own neural behavior, as "what *it* (the environmental thing presumably sensed) ***is***," thus endowing it with a measure of "reality." Such respective endowments of reality are based on the neurally behaved mode of *"detection"* for the subsequently behaved "environmental" feature in question, …a mode of "detection" to which we refer as our way of having

come to "know" of that feature's putative "environmental existence" (e.g., "I *saw* it," "I *heard* it," "I *smelled* it, etc.").

Note that our agentially attributive language, in addition to externalizing and implicitly imparting realness to what is actually some internal neural behaving, also tends to cast some such events, not as merely occurring, but as things that *"we,"* as mysterious fictitious agents, are ***do****ing* initiatively. Note too, that *environment* is a neurally behaved conceptual construct by which an intrinsically immured unit of appropriately structured matter reacts to sensory events on its side of an inferred sensory interface that "it" cannot transcend. The "it," traditionally regarded as an ethereal entity (often called the "spirit" or the "self") can occur in relation to its "hosting" unit of intricately structured organic matter only via an exhibition by that material of certain of its intrinsic, neural behavioral *processes*, which putatively occur automatically under appropriate stimulation. Thus, again, the absence of any capacity for its spontaneity endows an agential self with redundancy. Nature leaves nothing for such a conjured agent to do.

A Review Featuring an Example

Let us begin by considering, *from the traditional* perspective, an apple falling from a tree branch to the ground. Let us suppose, as we typically do, that an energy stream is present in the form of light shining *on* that falling apple. Pursuant to that supposition: That energy stream, putatively after impinging on that falling apple, may be said to reflect away through an environmental medium. According to our traditional reality, that reflected energy stream continues to retain the order acquired through its interaction with that gravitating apple (which is now being regarded as a potential "stimulus"). That particular energy stream, which allegedly travels from that falling apple, is said to reflect the activity of that plunging object, because when that putative energy stream presumably impinges on the eyes of an observer, a falling apple tends to be what that observer neurally behaves and typically claims, agentially, to be "seeing." More accurately, a falling apple is what parts of that observer's neural structure behave in visual awareness and interpretive modes.

Note, however, that each of us only behaves, neurally, the so–called "real" environment of which, respectively, we claim to be aware, a reality that inheres only in the mode of such a neural behavioral construct.[22] Note, too, that there would be as many "environments" as there are individuals to behave them. Each such product (i.e., environment) exists only in the behavioral process mode of an individual and presumably differs from the others in part according to the individuality of its mediator. And finally, note that the "community of individuals," each of whom is producing, in neural behavioral mode, such a unique environmental construct, exists only in the isolation of each *single individual's environmental* construct and thus remains virtual. That is, the reality of such a community, as part of a remote environment that would be independent of its individual constituent members, cannot be established. Thus, what might be regarded as a group of interacting people inheres only in the neural behavior of an individual "observer of" that group as a part of that isolated individual's unique and neurally behaved environmental construct. That individual, rather than "observing a remote group of real individuals" is instead behaving that group into a virtual existence cast only in process mode.

To interpret more validly such a perhaps unfamiliar reality–construct, let us begin once again with the more familiar fictitious perspective of a personal agent acting on a presumably real external environment. This illustration will again feature a falling apple, but in the course of this example the traditional version of reality will transition to the corresponding behavior–intrinsic perspective on reality.

To begin: An energy stream incoming from elsewhere may impinge upon an already falling apple and reflect, duly modified by that apple per se and by its gravitational activity, so as to exhibit some of the orderliness that interpretively *is* that apple and its ongoing plunge to the ground. The reflected energy stream, presumably retaining that order as it moves away from that falling and putatively remote apple, may impinge on the eye of an observer (a mere material entity) who, given that impingement, thereby might neurally behave the sensation of that plunging fruit. That initial neural awareness behavior presumably may then chain very quickly to a kind of neural behavioral "interpretation" during which the early awareness transitions interpretively to a "recognition."

Typically, with the contribution of some concurrently evoked logic, the neural aspects of this kind of sequence have been regarded collectively *as* that person agentially "becoming aware of the occurrence" of such an independently real "environmental" event—in this case, a remote apple dropping to the ground**.** While the traditional presumption features a remote real environment that presumably remains independent of any "observer," note from the internal perspective that the actual sequence of neural behavior privately endows that ongoing neural behavioral chain with traditional "reality" for the construct of environment that emerges within it and *is only conceptually projected to externality.*

To consider how that occurs, note that further neural behavior is putatively stimulated by the initial "awareness" behavior in what is called a *chaining* process (one behavior stimulating another, and so on). Thus, through such further neural behavioral

chaining, arises the *assumption* (more neural behavior) that the early awareness/recognition behavior, which is happening internally, *represents* an aspect of an external environment that presumably is being "detected." After all, it is called "awareness," which implies a "real" external (environmental) domain as revealed in turn by the proposition "of" that it demands (as in an "awareness *of* …something"). The neurally behaved "environment" is then accorded a status of "real," insofar as subsequent behavior comports with that status as a result of previous conditioning processes. However, the "environmental reality" of the falling apple inheres only in neural behavioral process that is occurring exclusively *within* a material organic entity that possesses a capacity for the requisitely elaborate, neural b**e**havioral, processes. The "physical reality" of one's external environment represents a kind of "interpretation" of a private internal neural–behavioral construct. Any actual "contact" with a presumed externality remains impossible, and what passes as such is but further internal process stemming from prior internal process, all in neural behavioral mode.

These considerations inform a more comprehensive answer to an old riddle: If a tree falls in the forest in the absence of anyone to hear it, does it make a sound? However, if that particular "tree" is not occurring in behavioral process mode as a part of any individual's neural behavioral construct, that tree has no established existence, and the question about it is meaningless.

Summary and Conclusion

From the internal perspective of a behaving material entity, the conceptual projection of that neural behavior into a "real remote environment" is entirely inferential and occurs *only in the mode of more neural behavior* that chains from what accordingly is denoted as initial *"awareness responses."* This analysis forces us to step back from the traditional notion of the reality of an external environment, because our external environments can manifest only internally, in a neural behavioral mode, as our respective inferential constructs, which is all that can occur in that regard to our kind of material units. Further "probes" misinterpreted to be *of* our external environments, presumably to confirm aspects of their reality, may include "muscular behavior" by "one's body," but one's body is a part of one's neurally behaved "environment."

Note that, when neural behavior creates an environment, that conceptual environmental construct includes the behaving body as well as the "external" realm that surrounds it. Pursued more broadly, matter in general (and hence the material world) exists merely as inherent implications occurring in the isolated mode of interpretive neural behavioral process. Although various other individuals as well as one's own body are conceived as parts of one's environmental construct, such a "community of individuals" remains a neural behavioral product of the *single* individual in which that community is (a) behaved, (b) only conceptually projected to externality, and (c) endowed conceptually with material substance.

If other individual units of behaving organic matter exist in an "outside" realm beyond that in which the behaviorally immured individual remains isolated, their respective individual environmental constructs would be unique products of *their own* respective and isolated behavioral repertoires, each such construct existing only unto itself. While two pieces of gravel cannot communicate for lack of the structure for communicative activity, a more profound reason, which pertains both to gravels and to humans, is that the concept of communication among individuals (of whatever kind) requires a real environment, independent of each of them, in which both exist. Such an environment, with its own reality independent of the individuals said to occupy it, cannot be established. "Communication among individuals" remains but a *logical assumption* by a single material unit as it dwells in its own isolation. Note that from the internal perspective of a behavior–capable unit of matter, notions of social interaction rely for their emergence on conditioned logic and are not appreciations of "real" external evidence, as the traditional perspective would have it. "Interactions among individuals" would have to emerge in the neural behavior of each intrinsically isolated unit of organic matter and do so in the absence of any means by an individual, in its behavioral isolation, to verify an external existence for the others. "Social community" inheres in neural behavioral mode as a private construct. In more common agential terms, we might say that "efforts to establish" such an external reality, including instances of sociality, double back on themselves, with "each" unit of matter resolved as a community of one.

From the *traditional* perspective of what is actually one's environmental construct, although neural behavior is just another class of occurring behavioral activity that certain body parts have the structure to exhibit, neural behavior was easily misconstrued throughout human history. Wrongly accepted as operational evidence of a mystical agential self at work, neural behavioral process was widely misinterpreted as the activity of a proactive self–spirit. The evolution of the language by which people now commonly describe these neural behavioral processes has occurred in adaptation to the prevailing traditional assumption of a fictitious personal self–agent residing managerially in the midst of all such behavioral activity. Thus tended to arise in each human the troublesome and fictitious concept of an agential sentience, a notion that involved manifestations of

mystical, internal, self–agents, their various managerial activities, and the many misleading implications that derive from such assumptions.

The invalid account of the nature of a person being mentioned here has become an interwoven component of human culture, and most of us live our lives within the bubble of that fiction. However, the difficulty of comprehending the implications of an unknowingly fictional account of complex practicality remains subject to exponential increase. People occasionally make reference to this historical conundrum as "the great mystery of life." Each individual is now left to confront the task of redefining nearly everything.[23]

Presumably, a human is a "chunk of matter," as is a rock. While a human being can establish only its own behavioral self as real, in its virtual environmental construct the human is capacitated by its structural complexity to act (*presumably re*act) automatically to *presumed* energy impingements and to do so in multitudinous and elaborate behavioral ways. In comparison, under similar circumstances, what a human behaves as a more uniformly structured material entity (e.g., a rock) presumably is constrained by its structural simplicity to exhibit fewer and often less interesting actions (*presumed* to be *"re*actions" to environments). Thus, in the environmental construct behaved by a human, a rock and a human being, given similar mild impingements of electromagnetic energy, will both get a little warmer. The neural behavioral manifestation called "the rock," given its simple and uniform structure, exhibits nothing else. The human, on the other hand, with the elaborate intricacy of its organic structure, may also recite some Shakespearian verse. Historically, that kind of human/rock distinction, though of modest profundity, has spawned delusions of grandeur in the human.☘

Endnotes with References

[1] This paper features three different uses for quotation marks. The first is to set off actual quotations of previously presented verbal material. Second, quotation marks may set off slang or vernacular words or phrases that are the commonly used equivalents of more formal or more grammatically correct expressions. Third, quotation marks may set off familiar words, phases, or brief passages that may induce invalid implications when reconsidered from the newer perspective being developed in this work.

[2] "Ancient" merely indicates that the speaker's explanatory capacity has been overcome by the antiquity of the events in question. Evoking an ancient mystical start functions as a stand–in for the admission of ignorance, to which cultural stigma is attached. However, with appropriate philosophical training, well–prepared scientists do not avail themselves of such avoidance in the guise of mystical accounts. Instead, they accurately delineate their domains of ignorance, carefully preserving them for future resolution, but only of the kind characteristic of good science.

[3] See, for example, Hawking, S., & Mlodinow, L. (2010). *The Grand Design.* New York: Bantam. These authors develop an argument against free will from the perspective of physics. Nevertheless, they allude, perhaps carelessly or in appeal to popular misconception, to certain procedures that create a "desire" by a subject to behave in a certain way as if a body–managing inner person must desire to behave that way before that behavior can occur. That is, an implicit inner agent must be made to "desire" a behavioral action before it will direct its host body to so act. While these authors perhaps "know better" than what they have said and implied in this regard, such misleading ways of referring to behavioral events characterize a contemporary scientific population that remains largely unschooled in the basic science of behaviorology and hence prone to carelessness in their address of behavioral phenomena. Generally untrained in behaviorology, the contemporary scientific community instead tends to accept and rely on psychology as its source of behavioral principles. In contemporary culture organized psychology thrives, even among a substantial fraction of the natural scientists. However, psychology, lacking a unifying integral paradigm, represents a politically inspired compromise between the organized natural sciences and the forces of organized superstition. The natural science community, having ceded behavioral phenomena to the pseudo–sciences condoned by organized superstition (a.k.a. the "soft" sciences), in return has enjoyed the partial neglect of organized superstition within the culture and especially within academia. Thus the natural science community, during the period of its rise toward cultural prominence, has procured tacitly from its cultural nemesis a measure of neglect by ceding to organized traditional superstition what is arguably the most important domain of phenomena that it could have been addressing, namely human behavior. The relatively recent emergence of behaviorology as a basic natural science represents a long overdue correction of this cultural perversion. For a historical account of the emergence of behaviorology see Fraley, L. E. & Ledoux, S. F. (2015). Origins, status, and mission of behaviorology. In S. F. Ledoux. *Origins and Components of Behaviorology—Third Edition* (pp. 33–169). Ottawa, Canada: BehaveTech Publishing. For a 570 page introductory text on behaviorology, see Ledoux, S. F. (2014). *Running Out of Time*—

Introducing Behaviorology of Help Solve Global Problems. Ottawa, Canada: BehaveTech Publishing. For a more comprehensive coverage of behaviorology (1,596 pp.) see Fraley, L. E. (2008). *General Behaviorology: The Natural Science of Human Behavior.* Canton, NY: ABCs.

[4] For a comprehensive history of the evolution of behaviorology, see Fraley, L. E. & Ledoux, S. F. (2015). Origins, status, and mission of behaviorology. In S. F. Ledoux. *Origins and Components of Behaviorology—Third Edition* (pp. 33–169). Ottawa, Canada: BehaveTech Publishing. For a summary of the development of this discipline see Ledoux, S. F. (2012). Behaviorism at 100. *American Scientist, 100* (1), 60–65, or, for its longer peer–reviewed version, see Ledoux, S. F. (2012). Behaviorism, at 100 unabridged. *Behaviorology Today, 15* (1), 3–22.

[5] Prepositions are typically innocuous terms of relation, and a recurring preposition in some common context, if invalidly cast, may serve to so misguide critical thinking that the implications of such an inconspicuous error can reach culture–distorting proportions.

[6] For a similar conclusion derived by physicists operating at their own level of analysis, refer to Hawking, S., & Mlodinow, L. (2010). *The Grand Design.* New York: Bantam. See the following passage on p. 172: "According to the idea of model–dependent realism …our brains interpret the input from our sensory organs by making a model of the outside world. We form mental concepts of our home, trees, other people, the electricity that flows from wall sockets, atoms, molecules, and other universes. These mental concepts are the only reality that we know. There is no model–independent test of reality." Note the authors' stylistic reliance on the seemingly autonomous inner agent as is commonly deemed communicatively helpful, here in the plural form called "we" and attributively, "our."

[7] That natural scientists, like everyone else, exhibit assumptive leaps is not an issue for concern in this context. Of valid concern is when and why such leaps occur. The assumptive leaps of natural scientists tend to come late in the course of their ongoing objective verifications of specific instances. Thus, leaps to assumptions that lie beyond the support of directly relevant databases must rely exclusively on foundations of *previous* objective verifications. This pertains to the well–known scientific process of endowing untested conclusions with acceptable reliability on the basis of objective validations during sufficiently similar prior instances. Thus, for a more common practical instance, given a particular incredibly rare and never before encountered kind of item to be lifted from a shelf, great care may be taken not to drop it even though no directly relevant data is available concerning the consequences of dropping that particular kind of item.

[8] The terms *endovironment* and *ectovironment* were introduced to behaviorologists by John Ferreria, the current Chairperson of The International Behaviorology Institute. While dropping the interior –*en*– may afford both economy of word–length and convenience in pronunciation, dropping that –*en*– may also be justified insofar as ***en****viron*– is perhaps encumbered with an element of redundancy. The "viron–" part comes from a root that means *circle* (from *virer*, meaning *to turn,* which also serves as the root of our contemporary word *veer*). Thus, the *viron*– part of *environment* already mildly connotes encirclement, or surrounding, *before* attachment of the prefix *en*–.

[9] Note that this statement is based on the common assumption that the links in chaining neural behaviors feature processes that not only occur sequentially, but also involve respectively different parts of the brain. The neural events would thus be separated both by time and distance. If the neural physiologists were to insist that the links in a particular chain of neural behaviors actually occurred to the same part of the brain, the separation of the behavioral chain links would be only temporal, and the energy flow from link to link could perhaps be characterized as more of a linger than a transmission.

[10] Incoming energy from an environmental stimulus is seldom if ever sufficient for the occurrence of the resulting behavior. The energy arriving from an environmental stimulus, in addition to selectively determining the behavioral response within the range of bodily capacity, is said in most if not all cases merely to "trigger" the release of potential energy that is stored in the body via the nutritional system to meet the energy requirement for that behavioral response. Note how an account for behavior at the energy–tracing level of analysis can seem to leave nothing about behavior production to be done by a behavior–originating self–agent.

[11] This sentence alludes to what we call "different levels of analysis," as, for instance, between behaviorology and physiology. Unlike behaviorological analyses, which involve mere correlation between environmental stimuli and the behavioral responses that those stimuli presumably control, physiological analyses typically involve a different level of analysis that *requires* actual tracings of those "causal" energy streams.

[12] Qualifications are attached to the conservation of energy principle. For example, imagine a particle of

matter somehow dispersed away from a field of particles of which it had been a part. Assume that this particle is departing with an enormous amount of kinetic energy in a direction that takes it away from its original matter/energy system and into the realm of no other (consider a rogue outbound lone–star at the outer edge of the expanding universe). Its original kinetic energy is detectable only in relation to the material system from which it has departed. Eventually, if encountered alone in emptiness, intrinsically it could seem, to an isolated observer with a similar travel history, to be still or fixed, because only with respect to another material entity can its kinetic energy be established, and with respect to that observer it would not be moving. That is, when the linkage with its former material system can no longer be established, the original allotment of kinetic energy carried by that particle can no longer be detected and measured by an accompanying observer. With that relational severance, any kinetic energy with which it may have started seems not to be extant. The concept of kinetic energy is thus revealed as a concept of relativity. If by some chance that particle should eventually come into a new and isolated relationship with another particle, a new kinetic energy for the first particle is established with respect to that new particle, and that new kinetic energy may differ vastly from that with which the initial particle had been endowed by its relation with the system from which it originally departed.

[13] Behaviorological "conditioning" processes work by reconfiguring the neural structures that mediate the relevant responding. The detailed explication of that reconfiguration of neural structure falls primarily within the province of the neural physiologists.

[14] Recall that amplification implies an intensification that does not alter the intrinsic orderliness.

[15] The energy flow arriving from an environmental feature is insufficient to produce a behavioral response directly. Nevertheless, the weak incoming energy may be sufficient to produce the small micro–changes that release nutritionally stored potential energy in an amount needed to support a discriminatively effective bodily response. If, in reports of such cases, attention is to be called to the details of such an energy releasing sequence, the feeble incoming energy stream may be said merely to "trigger" the response rather than to "evoke or stimulate" it. The verb form of "trigger" implies a feeble action that upsets a delicate balance such that a store of potential energy is released.

[16] The following article provides an example from the neural physiological side: Silva, M. T. A., Gonçlaves, F. L., & Garcia–Mijares, M. (2007). Neural events in the reinforcement contingency. *The Behavior Analyst, 30* (1), 17–30.

Also of note: B. F. Skinner, in chapter 12 of his 1938 book entitled *The Behavior of Organisms,* presented a review of the relation between his science of overt behavior and the underlying neural physiology. At the end of that chapter Skinner included a quote from Mach's 1914 book entitled *The Analysis of Sensation* (English translation, Chicago: The Open Court Publishing Company). At the start of a chapter on physics and biology, Mach addressed cooperation between those two fields and mentioned both advantages and limitations of such interdisciplinary cooperation.

Familiarity with the basic principles of neighboring scientific fields proves especially helpful in the formulation of research questions in one's own field. A counterexample might involve attempts by a psychologically influenced brain scientist to explore the underlying neural activity of a seriously assumed agential self.

[17] The distinction being drawn here pertains to natural developments over the history of the planet. Recent technological interventions have resulted in modern robotics, a field in which inorganic assemblages can exhibit approximations of biological behavioral process. However, note that the evolution of robots began with a discontinuous origination in their own evolutionary history whereby an evolving biological species (humans) reached a developmental stage at which they could behave prototypic robots into initial existence, thus mimicking their own mythical origination by a deity. Note, too, that in an important sense behaving organisms can be described as naturally evolved biological robots.

[18] In their book Hawking and Mlodinow, (2010. *The Grand Design.* New York: Bantam), who operate from the perspective of mathematical physics, arrived at a similar conclusion. On p. 140, for example, the authors concluded, "we create history by our observation, rather than history creating us." The basic notion that each individual organism behaves its own environment into a logical "existence" might emerge through the objective scrutiny of the issue by any kind of natural scientist. And with their general introduction to behaviorology, habitual explanatory reliance on proactive mini–deities called "selves" would tend to disappear from their reports.

[19] Note that "logic" is a pattern of neural behaving. Note, too, that the "discriminative" nature of neural behaving theoretically could be based on (could occur because of) a kind of microstructural differentiation among the neural body parts that respectively mediate such responses. That is, different parts of the neural brain structure, each having its own microstructure, could mediate its own forms of neural behavior. That presumably could be the basis of "discriminative responding." What traditionally we construe as "conditioning" to behave logically would thus be a process resulting in neural microrestructuring. More detailed explications of any such general neural effects are for the neural physiologists (a.k.a. brain scientists) to provide.

[20] The term "sensation," in implying a remote environment as the source of its stimulation, represents a term that comports implicitly with the traditional concept of externality.

[21] While shaping procedures change the form of a response, the process of *conditioning*, in general, renders a particular kind of response more or less frequent in the presence of a particular stimulus, thus increasing or decreasing the reliability of the functional relation between that stimulus and a particular kind of behavioral response (to that stimulus, as they say). The two main classes of conditioning are operant conditioning and respondent (or "classical") conditioning, which respectively are made to occur via different procedures. While this work contains repeated references to conditioning, the conditioning processes per se are not explicated herein. For explanations of operant and respondent conditioning, see Fraley, L. E. (2008). *General Behaviorology: The Natural Science of Human Behavior.* Canton, NY: ABCs. Also see Ledoux, S. F. (2014). *Running Out of Time—Introducing Behaviorology of Help Solve Global Problems*. Ottawa, Canada: BehaveTech Publishing. For more seminal discussions of operant and respondent conditioning, see Skinner, B.F. (1953 [first paperback edition, 1965]). *Science and Human Behavior.* New York: The Free Press.

[22] See Chapter 29, entitled Reality (pp. 1361–1523), in Fraley, L. E. (2008). *General Behaviorology: The Natural Science of Human Behavior.* Canton, NY: ABCs. Should the publisher's supply becomes exhausted (contact ABCs through ledoux@canton.edu) it may still be possible to obtain copies directly from the author (lfraley@citlink.net).

[23] An old satirical maxim reminds us that we cannot convince people of something if they do not already know it. Accordingly, this document adds nothing that is fundamentally new to the long–entertained general idea of people as naturalistic entities—a concept of human beings that natural scientists and their intellectual followers have long claimed to respect. The point of this work is to pursue some perhaps neglected implications of that long espoused naturalistic view of human beings. If the reader purports to entertain the naturalistic perspective, then this work may afford a more penetrating introspection of oneself, who thereby may be found more interesting than as previously appreciated.

Syllabus Directory

The most recent issue of *Journal of Behaviorology* that features a syllabus directory contains these two lists of current syllabi. These lists show where to find the most up–to–date versions (in title and content) of TIBI's current course syllabi. The first list organizes the syllabi by the chronological volume and number where you can find each one (with volumes 5 through 15 under the name *Behaviorology Today*). The second list organizes the syllabi by numerical course number.

Current Syllabi by Volume & Number

Volume 7, Number 2 (Fall 2004): BEHG 101: *Introduction to Behaviorology I.**
Volume 7, Number 2 (Fall 2004): BEHG 102: *Introduction to Behaviorology II.**
Volume 7, Number 2 (Fall 2004): BEHG 201: *Non–Coercive Child Rearing Principles and Practices.**
Volume 7, Number 2 (Fall 2004): BEHG 355: *Verbal Behavior I.**
Volume 8, Number 1 (Spring 2005): BEHG 400: *Behaviorological Rehabilitation.*
Volume 8, Number 1 (Spring 2005): BEHG 415: *Basic Autism Intervention Methods.**
Volume 8, Number 1 (Spring 2005): BEHG 420: *Performance Management and Preventing Workplace Violence.**
Volume 8, Number 1 (Spring 2005): BEHG 425: *Non–Coercive Classroom Management and Preventing School Violence.**
Volume 8, Number 1 (Spring 2005): BEHG 475: *Verbal Behavior II.**
Volume 8, Number 2 (Fall 2005): BEHG 410: *Behaviorological Thanatology and Dignified Dying.*
Volume 9, Number 1 (Spring 2006): BEHG 365: *Advanced Behaviorology I.*
Volume 9, Number 2 (Fall 2006): BEHG 470: *Advanced Behaviorology II.*
Volume 10, Number 1 (Spring 2007): BEHG 120: *Non–Coercive Companion Animal Behavior Training.*

Current Syllabi by Course Number

BEHG 101: *Introduction to Behaviorology I:*
Volume 7, Number 2 (Fall 2004).*
BEHG 102: *Introduction to Behaviorology II:*
Volume 7, Number 2 (Fall 2004).*
BEHG 120: *Non–Coercive Companion Animal Behavior Training:*
Volume 10, Number 1 (Spring 2007).
BEHG 201: *Non–Coercive Child Rearing Principles and Practices:*
Volume 7, Number 2 (Fall 2004).*
BEHG 355: *Verbal Behavior I:*
Volume 7, Number 2 (Fall 2004).*
BEHG 365: *Advanced Behaviorology I:*
Volume 9, Number 1 (Spring 2006).
BEHG 400: *Behaviorological Rehabilitation:*
Volume 8, Number 1 (Spring 2005).
BEHG 410: *Behaviorological Thanatology and Dignified Dying:*
Volume 8, Number 2 (Fall 2005).
BEHG 415: *Basic Autism Intervention Methods:*
Volume 8, Number 1 (Spring 2005).*
BEHG 420: *Performance Management and Preventing Workplace Violence:*
Volume 8, Number 1 (Spring 2005).*
BEHG 425: *Non–Coercive Classroom Management and Preventing School Violence:*
Volume 8, Number 1 (Spring 2005).*
BEHG 470: *Advanced Behaviorology II:*
Volume 9, Number 2 (Fall 2006).
BEHG 475: *Verbal Behavior II:*
Volume 8, Number 1 (Spring 2005).* ❧

*An older version appeared in an earlier issue.

In Response To Fraley, 2015

Stephen F. Ledoux*

suny–Canton

Abstract

In addressing far more complex matters, Fraley's 2015 paper ("What is Reality to an Organic Unit of Matter? Some Physics of Behavior, with Implications for Sentience and Sociality") leaves a related implication unstated. Briefly addressed herein, not as any sort of criticism of Fraley's paper but as a supplement, that implication pertains to a reassurance, especially for applied discipline members, regarding the practicality of the behaviorology discipline, that the disciplinary direction can only *gradually* evolve toward full implementation of a thoroughly naturalistic internalized (i.e., robotic) perspective since that perspective has as yet to develop practicality. No quick dump of the naturalistic traditional (i.e., environmental) perspective is possible, because it currently maintains the practical components of the discipline for applications and interventions at the cultural interface.

Separate Values for Naturalistic Environmental and Robotic Perspectives

As an improvement over the scientifically *traditional* (i.e., naturalistic environmental) perspective, Fraley (2015) elucidates the naturalistic *internalized* perspective (which elsewhere he calls the robotic perspective; see Fraley, 2008). The internalized perspective covers the inevitable restriction of an organism (i.e, a unit of organic matter) to internal responding to putative stimuli that the neural chained components of such responding establish as real. While discussing this perspective is initially both difficult and confusing, due as much to its unfamiliarity as to its complexity, nevertheless the discussion proves worthwhile in enhancing the long–term accuracy with which natural scientists of behavior deal with their subject matter. Having followed Fraley's (2008) lead, I subsequently discussed some of the basics (Ledoux, 2014). Yet in considering the three references mentioned so far, I find that none fully considers a different kind of implication, one relevant to assuring the viability of the behaviorology discipline during a transition from, using the earlier terms, the naturalistic environmental perspective to the robotic perspective. This short *In Response* can begin the process of remedying this situation.

As those references have described it, the robotic perspective maintains respect for the philosophy of naturalism, the prevailing philosophy of science of the natural sciences generally, as well as for a particular subset of naturalism, radical behaviorism (Ledoux, 2012a, 2015b), which the philosophy of science of the behaviorology discipline. In doing so, the robotic perspective derives directly from all the historically earlier experimental, applied and interpretive discoveries of natural scientists regarding behavior and its principles, concepts, and laws (e.g., Ferster & Skinner, 1957; Ledoux, 2015; Peterson & Ledoux, 2014; Skinner, 1957). The result, the robotic reality that Fraley discusses, shows where the science can take not only behaviorologists but also—and with equally valuable cultural benefits—the natural scientists of other subject matters.

Still, just as the science, which led to this elucidation of robotic reality, had first developed for 100 years, during which time it had elaborated a broad range of *practical* intervention technologies, so too the science likely to derive *from* this reality elucidation may similarly take another 100 years before having elaborated a similarly *practical* broad range of intervention technologies, something that it, per se, essentially currently lacks. (Or, perhaps an *In Response* like this one may, sooner than otherwise, evoke such developments.)

Meanwhile, current contingencies will continue to compel us to study, research, develop, and apply all the current and newly discovered principles, methods, concepts, laws, and interventions that contingencies in the last 100 years have made available, so as to continue to bring any and all benefits that our behaviorology

*Address correspondence to ledoux@canton.edu.

Key words: behaviorology, environment, physics, reality, robotics

discipline can supply to bear on enhancing human and planetary sustainability and survival (Ledoux, 2014). That is, the more naturalistic view of reality that Fraley provides will in time presumably mature to the point of providing for humanity's future, behavior–related practical needs. Yet, until that time, the older naturalistic environmental perspective requires continuing study and application by current and new students of behavior so that they continue to provide for humanity's *current*, behavior–related practical needs. Said more simply, the naturalistic robotic perspective seems currently more accurate but less practical than the naturalistic environmental perspective, a presumably temporary situation that leaves the naturalistic environmental perspective serving present, behavior–related practical needs for the range of current natural science and engineering disciplines, as well as all applied behavior fields. For similar reasons, suggestions that the naturalistic environmental perspective be dropped are *not* occurring at present (at least not to extents that would evoke recognition responses from this author) as that would likely be premature with respect to our discipline easily continuing to meet its cultural–interface obligations. (Of course, the past and present suggestions continue regarding dropping the theologically mystical, and the secularly mystical, agential environmental perspectives!)

Also, before embarking on the *activity* of discipline–wide, comprehensive theoretical and practical elaborations of the robotic perspective, I think behaviorologists of the early twenty–first century could better serve humanity, as well as lay a more secure foundation for such *activity,* by moving further along in first establishing solid and enduring programs and departments of behaviorology. Getting caught up too fast in the direction of explicating and extending the robotic perspective can be a strong distraction from these more mundane but at least equally important matters, a problem to which this author can attest due to contingencies competing to compel that direction.☘

References (with some annotations)

Ferster, C. B. & Skinner, B. F. (1957). *Schedules of Reinforcement.* Englewood Cliffs, NJ: Prentice–Hall. The B. F. Skinner Foundation (www.bfskinner.org) in Cambridge, MA, republished this book in 1997.

Fraley, L. E. (2015). What is reality to an organic unit of matter? Some physics of behavior, with implications for sentience and sociality. *Journal of Behaviorology, 18* (1), 13–25.

Fraley, L. E. (2008). *General Behaviorology: The Natural Science of Human Behavior.* Canton, NY: ABCs.

Ledoux, S. F. (2012a). Behaviorism at 100. *American Scientist*, *100* (1), 60–65.

Ledoux, S. F. (2012b). Behaviorism at 100 unabridged. *Behaviorology Today, 15* (1), 3–22.

Ledoux, S. F. (2014). *Running Out of Time—Introducing Behaviorology to Help Solve Global Problems*. Ottawa, Canada: BehaveTech Publishing.

Ledoux, S. F. (2015). Successful smoking control as an example of a comprehensive behaviorological therapy. In S. F. Ledoux. *Origins and Components of Behaviorology—Third Edition* (pp. 243–258). Ottawa, Canada: BehaveTech Publishing.

Peterson, N. & Ledoux, S. F. (2014). *An Introduction to Verbal Behavior—Second Edition.* Canton, NY: ABCs.

Skinner, B. F. (1957). *Verbal Behavior.* New York: Appleton–Century–Crofts. The B. F. Skinner Foundation (www.bfskinner.org) in Cambridge, MA, republished this book in 1992.☙

The TIBI 28th Behaviorology Anniversary Convention

Focusing on concepts, research, demonstrations, and interventions of interest to a range of professional audiences, including sustainability supporters, TIBI will hold the 28th Behaviorology Anniversary Convention on 5–7 June 2015 in Vancouver, BC.

In addition to presentations and panels, including special guest speaker Dr. Cathy Watkins, TIBI will have a range of recent behaviorology–related items available, such as media recordings and books, including these:

- **(CD)** ***August 1988 Public Radio Interview of the Organizers of the First Behaviorology Convention*** (2013)
- **(DVD)** ***Behaviorology and Education for Green Engineering and Sustainable Living*** (2015)
- **(Book)** ***General Behaviorology: The Natural Science of Human Behavior*** (Lawrence Fraley, 2008)
- **(Book)** ***Dignified Dying—A Behaviorological Thanatology*** (Lawrence Fraley, 2012)
- **(Book)** ***Behaviorological Rehabilitation and the Criminal Justice System*** (Lawrence Fraley, 2013)
- **(Book)** ***Running Out of Time—Introducing Behaviorology to Help Solve Global Problems*** (Stephen Ledoux, 2014)
- **(Book)** ***An Introduction to Verbal Behavior—Second Edition*** (Norman Peterson & Stephen Ledoux, 2014)
- **(Book)** ***The Science and Technology of Animal Training*** (James O'Heare, 2015)
- **(Book)** ***Origins and Components of Behaviorology—Third Edition*** (Stephen Ledoux, 2015)
- ***Plus a selection of study–question books and free TIBI Bookmarks***

Visit www.behaviorology.org for other details.

Behaviorology
THE INTERNATIONAL BEHAVIOROLOGY INSTITUTE, LTD. (TIBI)

Welcome

Search

WELCOME TO BEHAVIOROLOGY

- The natural science of human nature and human behavior
- A natural science of *why* human behavior happens
- A natural science that helps build a sustainable society in a timely manner

This is the current Web site of TIBI (The International Behaviorology Institute). You can find out more about us under **ABOUT US** under **HOME**.

You can also find our first website by selecting "**FIRST 10 YEARS ARCHIVE**" under **HOME**. In this archive, many articles from our journal, *Behaviorology Today* (up through Volume 14) appear under a range of topical categories.

Also, Check out the items under **NEWS** for the most recent announcements regarding:

- TIBI's annual *Behaviorology Anniversary Conventions*
- The availability of the latest issue of our fully peer–reviewed journal,*Journal of Behaviorology* (ISSN 2331–0774) which was previously entitled *Behaviorology Today*
- The appearance of important behaviorology articles elsewhere
- The publishing of books on various behaviorology topics
- And other items of interest

TIBI ETHICS AND PRACTICE GUIDELINES

The International Behaviorology Institute (TIBI) is a non–profit professional organization for basic and applied natural science of behavior researchers and educators as well as practitioners, many of whom practice Applied Behavior Analysis (ABA). As such, TIBI acknowledges and supports the Behavior Analyst Certification Board (BACB) "Professional and Ethical Compliance Code for Behavior Analysts". TIBI also supports the Association of Professional Behavior Analysts (APBA) policy on responding to ethical questions and concerns. NOTE that, to refer to the natural science of behavior that informs ABA, the BACB uses a term, "behavior analysis," that was in use before the need arose for a name that clearly indicates—the way the term "behaviorology" does—that this science and its applications are neither a part of, nor any kind of, psychology.

LATEST NEWS

With the Prosocial Progress Foundation (PPF), TIBI Releases Interview DVD May 27, 2014

TIBI Selects Site for the 28th Behaviorology Anniversary Convention May 25, 2014

27th Behaviorology Anniversary Convention Concluded and Appreciated May 25, 2014

Book Released on Behaviorology Applied to Dog Training April 30, 2014

Now Online: The Spring 2014 Issue of Journal of Behaviorology April 9, 2014

Editorial Review Board & Guest Reviewers

Visit www.behaviorology.org

Stay informed by visiting the TIBI web site regularly (www.behaviorology.org). We are always adding and updating material.

You can find a wide selection of useful articles, many from *Behaviorology Today* / *Journal of Behaviorology*, in *Adobe* PDF format. (If you need it, you will find a button to click, for a free download of Adobe's Acrobat Reader software, in the "First 10–years Archive" part of the site.) Also in the "First 10–years Archive," the articles are organized on several topical category pages (e.g., contributions to parenting and education, book reviews, and behaviorology around the world). The rest of the site features a single PDF for each full issue of both *Behaviorology Today* and *Journal of Behaviorology*. Other selections feature descriptions of TIBI's certificate programs and course syllabi, and links to some other helpful related web sites. Explore! ☙

Back Issues & Donations

Some back issues of the Journal are available; the cost is US$20 each, which includes air–equivalent postage. To place an order: Photocopy, fill out, and send in the "membership" form on a later page of nearly every Journal issue; check the "back issues" box, and list the volume and number of each back issue that you are ordering. Mail the form, with a check for the correct amount, in US dollars made payable to TIBI, to the address on the form.

Donations/Contributions are also welcome, and are tax–deductible as TIBI is non–profit (under 501–c–3).☙

Journal & Web Site Copyrights

TIBIA Membership Costs & Criteria & Benefits

The intrinsic value of TIBIA membership rests on giving the member status as a contributing part of an organization helping to extend and disseminate the findings and applications of the natural science of behavior, behaviorology, for the benefit of humanity. The levels of TIBIA membership include one "free" level and four paid levels, which have increasing amounts of basic benefits. The four annual paid membership levels are Student, Affiliate, Associate, and Advocate. The Student and Affiliate are non–voting categories, and the Associate and Advocate are voting categories. All new members are admitted provisionally to TIBIA at the appropriate membership level. Advocate members consider each provisional member and then vote on whether to elect each provisional member to the full status of her or his membership level or to accept the provisional member at a different membership level. Here are all the membership levels and their criteria and basic benefits (with dues details under *TIBIA Membership Cost Details* on the application–form page):

Free–online membership. Online visitors receive access (a) to past *Behaviorology Today* and *Journal of Behaviorology* articles and issues, (b) to accumulating news items, (c) to Institute information regarding TIBI Certificates and course syllabi, (d) to selected links of other organizations, and (e) to other science and organization features.

$20 Behaviorology Student membership (requires completed paper application, co–signed by department chair or advisor, and annual dues payment). Admission to TIBIA in the Student membership category is open to all undergraduate or graduate students in behaviorology or in an acceptably appropriate area. Benefits include *all* those from the previous membership level plus these: (a) a subscription to—and thus immediate postal delivery of—each new paper–printed issue of *Journal of Behaviorology* (ISSN 1536–6669), (b) access to special organizational activities (e.g., invitations to attend and participate in, and present at, TIBI conferences, conventions, workshops, etc.) and (c) access to available TIBIA member contact information.

$40 Affiliate membership (requires completed paper application and annual dues payment). Admission to TIBIA in the Affiliate membership category is open to all who wish to follow disciplinary developments, maintain contact with the organization, receive its publications, and participate in its activities, but who are neither students nor professional behaviorologists. Benefits include *all* those from the previous levels plus these: Access both to additional activity options at the interface of their interests and behaviorology, and to advanced membership levels for those acquiring the additional qualifications that come from pursuing behaviorology academic training. On the basis of having earned an appropriate degree or TIBI Certificate, Affiliate members may apply for, or be invited to, Associate membership.

$60 Associate membership (requires completed paper application and annual dues payment). This level is only available to qualifying individuals. Admission to TIBIA in the Associate membership category is open to all who are not students, who *document a behaviorological repertoire at or above the masters level* (such as by attaining a masters–level TIBI Certificate or a masters degree in behaviorology or in an accepted area) and who maintain a good record—often typical of "early–career" professionals—of professional activities or accomplishments of a behaviorological nature that support the integrity of the organized, independent discipline of behaviorology including its organizational manifestations such as TIBI and TIBIA. Benefits include *all* those from the previous levels plus TIBIA voting rights, and access to contributing by accepting appointment to a TIBIA or TIBI position of interest. On the basis of documenting a behaviorological repertoire at the doctoral level, an Associate member may apply for, or be invited to, Advocate membership.

$80 Advocate membership (requires completed paper application and annual dues payment). This level is only available to qualifying individuals. Admission to TIBIA in the Advocate membership category is open to all who are not students, who *document a behaviorological repertoire at the doctoral level* (such as by attaining a doctoral–level TIBI Certificate or a doctoral degree in behaviorology or in an accepted area), who maintain a good record of professional activities or accomplishments of a behaviorological nature, and who demonstrate a significant history—usually typical for experienced professionals—of work supporting the integrity of the organized, independent discipline of behaviorology including its organizational manifestations such as TIBI and TIBIA. Benefits include *all* those from the previous levels plus access to contributing by accepting election to a TIBIA or TIBI position of interest.☙

TIBIA Membership Cost Details

Establishing the annual dues structure for the different membership categories takes partially into account, by means of percentages of annual income, the differences in income levels and currency values among the world's various countries and economies. Thus, the annual dues for each membership (or other) category are:

CATEGORY	DUES (in US dollars)*
Student member	The lesser of 0.1% of annual income, or $20.00
Affiliate member	The lesser of 0.2% of annual income, or $40.00
Associate member	The lesser of 0.3% of annual income, or $60.00
Advocate member	The lesser of 0.4% of annual income, or $80.00
Member of Board of Directors:	The lesser of 0.6% of annual income, or $300.00

*Minimums: $20 Board Member; $10 others

(Retired Associate, Advocate, or Board Members: … 50% less)

Tibia Membership Application Form

(For contributions, a form ensures acknowledgement but is not required.)

Copy and complete this form (please type or print)—*for membership, contributions, back issues, or subscriptions*—and send it with your check (made payable to TIBIA in US dollars) to the TIBIA treasurer at this address:

Dr. Stephen Ledoux
TIBIA Treasurer
SUNY–CTC
34 Cornell Drive
Canton NY 13617 USA

Check if applies:
Contribution: ☐
Subscriptions:* ☐
Back issues:** ☐
❧ Vol. ___, #___
❧ Vol. ___, #___

Name:

Office Address:

Membership (category): ☐

Amount enclosed: US$

Home Address:

Office Phone #:

Home Phone #:

Fax #:

CHECK PREFERRED MAILING ADDRESS:

E-mail:

Office: ☐ Home: ☐

Degree/Institution:***

Sign & Date:

*Subscriptions are US$40 annually, the same as affiliate membership. **Back issues: US$20 each.

***For Student Membership:
I verify that the above person is enrolled as a student at:

Name & Signature of advisor or Dept. Chair:

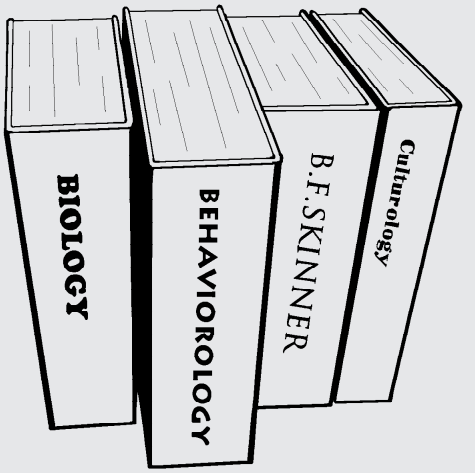
*TIBI / TIBIA Purposes**

TIBI, as a non–profit educational corporation, is dedicated to many concerns. TIBI is dedicated to expanding and disseminating the behaviorological literature at least through the fully peer–reviewed *Journal of Behaviorology* (previously called *Behaviorology Today*) and the behaviorology.org web site; TIBI is also dedicated to teaching behaviorology, especially to those who do not have university behaviorology departments or programs available to them; TIBI is also a professional organization dedicated to organizing behaviorological scientists and practitioners into an association (*The International Behaviorology Institute Association*—TIBIA) so that they can engage in a range of coordinated activities that carry out their shared purposes. These activities include (a) holding conventions and conferences and so on; (b) enabling TIBI faculty to arrange or provide training for behaviorology students; and (c) providing TIBI certificates to students who successfully complete specified behaviorology curriculum requirements. And TIBI is a professional organization also dedicated to representing and developing the philosophical, conceptual, analytical, experimental, and technological components of the separate, independent discipline of behaviorology, the comprehensive natural–science discipline of the functional relations between behavior and independent variables including determinants from the environment, both socio–cultural and physical, as well as determinants from the biological history of the species. Therefore, recognizing that behaviorology's principles and contributions are generally relevant to all cultures and species, the purposes of TIBI are:

A. to foster the development of the philosophy of science known as radical behaviorism;
B. to nurture experimental and applied research analyzing the effects of physical, biological, behavioral, and cultural variables on the behavior of organisms, with selection by consequences being an important causal mode relating these variables at the different levels of organization in the life sciences;
C. to extend technological application of behaviorological research results to areas of human concern;
D. to interpret, consistent with scientific foundations, complex behavioral relations;
E. to support methodologies relevant to the scientific analysis, interpretation, and change of both behavior and its relations with other events;
F. to sustain scientific study in diverse specialized areas of behaviorological phenomena;
G. to integrate the concepts, data, and technologies of the discipline's various sub–fields;
H. to develop a verbal community of behaviorologists;
I. to assist programs and departments of behaviorology to teach the philosophical foundations, scientific analyses and methodologies, and technological extensions of the discipline;
J. to promote a scientific "Behavior Literacy" graduation requirement of appropriate content and depth at all levels of educational institutions from kindergarten through university;
K. to encourage the full use of behaviorology as an essential scientific foundation for behavior related work within all fields of human affairs;
L. to cooperate on mutually important concerns with other humanistic and scientific disciplines and technological fields where their members pursue interests overlapping those of behaviorologists; and
M. to communicate to the general public the importance of the behaviorological perspective for the development, well–being, and survival of humankind.

*This statement of the TIBI / TIBIA purposes has been adapted from the TIBI by–laws.—Ed.

About Behaviorology, TIBI, and *Journal of Behaviorology*



Behaviorology is an independently organized discipline featuring the natural science of behavior. Behaviorologists study the functional relations between behavior and its independent variables in the behavior–determining environment. Behaviorological accounts are based on the behavioral capacity of the species, the personal history of the behaving organism, and the current physical and social environment in which behavior occurs. Behaviorologists discover the natural laws governing behavior. They then develop beneficial behaviorological–engineering technologies applicable to behavior–related concerns in all fields including child rearing, education, employment, entertainment, government, law, marketing, medicine, and self–management.

Behaviorology features strictly natural accounts for behavioral events. In this way behaviorology differs from disciplines that entertain fundamentally superstitious assumptions about humans and their behavior. Behaviorology excludes the mystical notion of a rather spontaneous origination of behavior by the willful action of ethereal, body–dwelling agents connoted by such terms as *mind, psyche, self, muse,* or even pronouns like *I, me,* and *you.*

As part of the organizational structure of the independent natural science of behavior, *The International Behaviorology Institute* (TIBI), a non–profit organization, exists (a) to arrange professional activities for behaviorologists and supportive others, and (b) to focus behaviorological philosophy and science on a broad range of cultural concerns. And *Journal of Behaviorology* is the referred journal of the Institute. Journal authors write on the full range of disciplinary topics including history, philosophy, concepts, principles, and experimental and applied research. Join us and support bringing the benefits of behaviorology to humanity. (Contributions to TIBI or TIBIA—the professional organization arm of TIBI—are tax deductible.)

Journal of Behaviorology

Dr. James O'Heare, Editor
1333 Rainbow Crescent
Ottawa Ontario K1J 8E3
CANADA