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A Science of Culture
Conceptual and Experimental Analysis on Cultural Selection

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Article1

A Science of Culture

Behavior Analytic Approach to Social Behavior and Cultural Selection

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Abstract

Behavior analysis offers a conceptual framework of the scientific model of selection, which explains selection on three different levels: phylogenetic, ontogenetic and cultural. Much effort has been made explaining operant behavior, both by large amounts of empirical research, and by developing its unit of analysis to investigate individual behavior (i.e. three-term contingency). We have the knowledge of how to influence individual behavior, explain and predict operant behavior, and thus, how to make interventions for improving the life of those individuals. On the other hand, far less consideration has been made about behavior on system levels, such as groups, society and organizations. Even though the world is facing significant challenges, such as climate change, resource scarcity, terrorism, crime and poverty, and that these problems are likely to expand in the future, due to the increasing complexity of the challenges and to inefficient efforts to alleviate them. Is the explanation of how individual behavior is shaped, changed and maintained, enough to make changes on a larger scale, and can we by this contribute to deal with prevailing challenges? Will we benefit from an own conceptual premises where cultural practices, and not just the behavior of individuals, are taken as the unit of analysis? This article will discuss how knowledge gained from behavior analysis can contribute to the understanding of human social behavior and practices, and how it can enable behavior analysis to deal with complex cultural issues.

Keywords: culture, unit of analysis, cultural practice, selection, control

Introduction

It is now widely recognized that great change must be made in the American way of life. Not only can we not face the rest of the world while consuming and polluting as we do, we cannot for long face ourselves while acknowledging the violence and chaos in which we live. The choice is clear: either we do nothing and allow a miserable and probably catastrophic future to overtake us, or we use our knowledge about human behavior to create a social environment in which we shall live productive and creative lives and do so without jeopardizing the chances that those that follow us will be able to do the same (Skinner, 1976b, p. xvi).

Skinner (1948) suggests a way to design such a social environment in the *Walden Two*, a novel about an utopian community designed by making use of principles from behavior analysis. Skinner describes two kinds of controlling agents; ceremonial, which are authorities like families, church and state, that are mainly based on aversive control; and technological control, which is related to the outcome of the group. In *Walden Two* there is an absence of ceremonial control, resulting in independent members that are equally interdependent on each other (Glenn, 1986). This utopian community may be considered to be far from the reality and the world we know. However, this novel does convey an important message, which is the core of *Walden Two*, and that is the positive outcome of reinforcement. By focusing on reinforcing desired behavior instead of punishing unwanted behavior, people will have more freedom, and will feel more in control of their own lives. "Under a government which controls through positive reinforcement the citizen feels free, though he is no less controlled. Freedom from government is freedom from aversive consequences"(Skinner, 1953, p. 348). The same principles apply to security, for instance from hunger, cold, care in sickness and in old age, which raises the same issue as freedom. A government that arranges an environment in which many common aversive consequences do not occur, positive consequences are easily

achieved, and extreme states of deprivation are avoided, increases the security of the citizen (Skinner, 1953). The question is how do we implement the knowledge of behavior to the controlling agencies, and if the understanding of behavior of individuals are adequate to deal with systems of many relations.

Cultural phenomena have not had the same status as individual behavior in the behavior analysis, thus the behavioral science have been more applied in issues related to individual operant behavior (problem behavior, learning and change management). This is understandable; scientists tend to focus on problems they can effectively address (Biglan, 1995). We have a well-established conceptual framework of complex human behavior, and empirically tested experimental and applied methods. Therefore we should no longer confine ourselves to only acknowledge the challenges; behavior analysts should be more involved in dealing with cultural issues. Should we bother explaining culture from a behavior analytic view, or just leave it up to other fields to handle? If we want a science of culture, and the opportunity to study cultural phenomena experimentally, the selectionist approach offers a unique possibility.

We have reached a point, however, where further progress in solving the myriad problems of human behavior requires that we understand the factors that influence cultural practices ... Our ability to change cultural practices depends on the development of a science of cultural practices. Such a science would focus on identifying the variables that influence those practices (Biglan, 1995, p. 13).

Behavior analysis have addressed many aspects of culture, such as social behavior (Skinner, 1953), control agencies (Skinner, 1953), cultural materialism (Biglan, 1995; Harris, 1979), and self-control (Biglan & Barnes-Holmes, 2015; Skinner, 1953). Those are the building blocks to understand and change behavior of individuals in cultures, and cultural

practices. However, recent year's behavior analysis has investigated cultural phenomena in its own right as a unit of analysis. This paper will described how our knowledge of behavioral processes at the individual level can help us gain a better understanding of cultural phenomena, and then go further describing how those processes can cumulate into a cultural unit of analysis. It will be argued that, even though it can be useful to describe operant behavior at the cultural level, we might benefit from treating culture as its own unit of analysis.

Social Behavior

Social behavior can be defined as any behavior where other people provide the discriminative stimuli, the reinforcers, or both, in an exchangeable manner. Most human behavior is social and if one wants to do something in a practical way about human affairs, understanding how people influence each other is essential (Biglan, 1995, p. 77). The culture that an individual is born into is composed of all the variables affecting him which are arranged by other people (Skinner, 1953).

Verbal Behavior

Verbal behavior can be considered a necessity for development of modern cultures. We can profit from what others have already learned by taking advice, heeding warnings, following instructions, and observing rules. By the making of laws, ethical practices are strengthened, and techniques of ethical and intellectual self-management are devised and taught. "Self-knowledge or awareness emerges when one person asks another such a question as "What are you going to do?" or "Why did you do that?"" (Skinner, 1981, p. 502). When behavior is passed from one individual to another it occurs to some extent in imitation and observational learning, but its most obvious development is in human language. "Language necessarily involves all three varieties of selection" (Catania, 2001, p. 157). Language

emerges through cultural selection, in which verbal behavior is passed on from one individual to another. Its primary function is that it is a very efficient way by which one individual can change the behavior of another. Giving verbal information or instructions is a way of changing another individuals verbal behavior. “We are so immersed in language that we find it difficult to treat it as a variety of behavior, and yet the functions of verbal behavior are crucial to our understanding of human behavior” (Catania, 2001, p. 158). Verbal behavior is about the function, and not the linguistic structure of language. It is analyzed like all other behavior, on its effect. Verbal behavior makes rules and rule governed behavior possible, which in turn makes social behavior possible.

Conforming Behavior

All behavior varies in the same way with changes in deprivation and reinforcement. Discrimination is formed in the same way and extinction in the same rate. Deprivation and satiation are controlled by both social and nonsocial conditions (Skinner, 1953). “Some progress toward explaining participation in a group is made by the analysis of imitation. In general, behaving as others behave is likely to be reinforcing” (Skinner, 1953, p. 311). One of the strongest reinforcer is simply other people’s attention. Any reinforcer that we obtain from others is accompanied by their attention to us, and therefore attention is a generalized reinforcer. This is true even when the attention is negative, like when a child behaves in a bad manner and gets the parents’ attention. If the parents pay little attention to less annoying behavior, any attention (even scolding) may be reinforcing for the child (Biglan, 1995). Human beings are very likely to behave in conformity to others. We are powerfully influenced by other people when we make decisions, in our attitudes, the way we talk, how we dress, what we purchase, what we support and do not support, and so on. There are few social situations in which conformity is not reinforcing. Agreements with others are met with

attention and approval (Biglan, 1995). The well-known conformity experiments made by Solomon Asch (1972) showed that the naïve subjects made the same choices as the group in about a third of the time, though this was clearly not right. Some of the naïve participants conformed to the group and made the same choice every time, some did it intermittently, and only a few did not conform at all (Biglan, 1995). By conforming to certain behavior, we are accepted by the group in which these are a mark of membership.

As each individual comes to conform to a standard pattern of conduct, he also comes to support that pattern by applying a similar classification to the behavior of others. Moreover, his own conforming behavior contributes to the standard with which the behavior of others is compared. Once a custom, manner, or style has arisen, therefore, the social system which observes it appears to be reasonably self-sustaining (Skinner, 1953, pp. 418-419).

Obedience

If people would do whatever they wanted all the time, it would result in chaos; therefore obedience as a social norm is important in every culture. For rules and laws to have an effect, we must have been reinforced in the past by following rules, and maybe also been punished for not doing so. Socialization from an early age, like teaching the child to obey authority, is considered good parenting. The parents shape the conformity behavior of the child, and are being reinforced both by the surroundings and the obedient behavior of the child, for doing so. But obedience also comes at a price. Obedience in its extreme form can have serious consequences when people for instance obey orders to hurt or kill other human beings. In the wake of Nazi Germany many questioned how such strong conformation was possible, which generated research focused on these phenomena, i.e. Milgram (1963)

experiments on obedience, Zimbardo (1973) Stanford prison experiment, Asch (1952; 1956) on conforming behavior.

Self-Control

Psychologists in general are primarily concerned with studying motivation, the reason why people behave the way they do. Behavioral analysis is mainly concerned with the function of the behavior, like what the selecting mechanisms are, and how to change behavior. Central in social psychology is Feininger (1957) theory about cognitive dissonance; a persons need to have balance between his believes (attitude, meanings) and his behavior, an accordance between ones saying and doing. When experiencing dissonance, the person will have a drive or feeling of discomfort, and therefore the need to adjust ones actions or the way one thinks and talks about it. This theory reflects how the social psychology explains behavior, where one of the most important determinants of human behavior originates from our need to preserve a stable, positive self-image (Aronson, 2010). The Norwegian poet Henrik Ibsen says "deprive the average human being of his life-lie, and you rob him of his happiness" (Ibsen, 1884). Behavior analysis focuses on the external variables that influence behavior, which can be observed and empirically tested. But in both theories the importance of the social setting is central. Explaining behavior in terms of self-image or self-esteem makes it difficult to deal with. Thus it could be more effective to talk about self-control, which is more translatable to behavioral terms.

Self-control is a valid trait in an individual, and self-controlling behavior is of great importance for survival in a social environment. The group reinforces practices of self-control, through negative reinforcement in the avoidance of aversive stimuli, in accordance with unwanted behavior, and by positive reinforcement of the self-control behavior. Low self-control is associated with indolence, crime and low social status. The theory of time

perspective (TP), argues that individuals with a dominant present orientation, are at risk for many negative life consequences, such as mental health problems, addictions, juvenile delinquency and crime. On the other hand, future orientation is claimed to lead to positive consequences in Western societies, such as higher socioeconomic status, greater academic achievement, and fewer health risk behaviors (Zimbardo & Boyd, 1999). Behavioral economics explains human behavior of decision making through the concept of discounting, the fact that people have the tendency to prefer smaller reinforcements than larger ones if it is closer in time (sooner). Discounting is often spoken of in accordance with impulsivity and self-control. Self-control, in operant terms, is engaging in behavior that leads to larger delayed reinforcers instead of behavior that leads to smaller, more immediate reinforcers. When punishment is involved the opposite will be the case. Discounting is, in other words, the devaluation you make of something of reinforcing value. It is an economic term and kind of an opposite interest calculation. The changing rate of value is referred to as K , which is an index of sensitivity to delay. When K is large, the current subjective value of Larger Later Rewards (LLR) decreases substantially as a function of delay. Individuals produce large K values by forgoing LLRs to accept smaller rewards that are immediate, and thus are labeled as impulsive. On the other hand, when K is small, the subjective value of LLRs decreases little as a function of delay, and individuals that produce small K values by forgoing small rewards now for more lucrative LLRs, are considered to be self-controlled (Critchfield & Kollins, 2001). The knowledge of temporal discounting, in accordance to behavior analysis, can be used to understand and treat problem behavior related to “lack of impulsivity control”. By arranging the reinforcing contingencies, or by shaping of tolerance for delay, it would be possible to intervene in everyday behaviors like weight loss, smoking, bad habits, to more serious problems like criminal behavior, and diagnostic behaviors like ADHD. Scientific research, clarifying how future-oriented behavior is established and how it might be

increased, is predicted by some to be one of the most important developments guiding the further beneficial evolution of human societies. “Once humans developed the ability to frame relations between current actions and future outcomes it became possible to greatly improve the ability of human groups to act in light of the future” (Biglan & Barnes-Holmes, 2015, p. 5).

The functional contextualist perspective that organizes contextual behavioral science focuses on prediction and influence of phenomena. From this perspective, the existing literature is limited because it fails to examine the environmental context that establishes relationships between cognitive and affective states and future-oriented behavior (Biglan & Barnes-Holmes, 2015, p. 2).

Borba, Tourinho, & Glenn (2014) defines self-control as “the response, within a choice situation, that produces reinforcers of greater magnitude but with a longer delay. The self-control response is an alternative to impulsive responses, which produce more immediate reinforcers of lesser magnitude”(p. 69). They further describe a particular type of self-control, defined as ethical self-control. This is when self-controlled responses produce delayed consequences that are favorable to the culture (Borba, Tourinho, et al., 2014). This can be considered a parallel to altruism, but described in behavioral terms. Ethical self-control has been examined in different experimental studies (i.e. Borba, Rodrigues da Silva, et al., 2014; Borba, Tourinho, et al., 2014).

Decision Making

There are several variables affecting our decisions, so how rational can decision-making behavior be. Not only would we have problems processing all information, the information is often also limited. Dynamic complexity, such as phenomena we have limited experience with, or weak deductive powers can lead to bias. Heuristics, or “rules of thumb”,

that we base new decisions on may also be wrong. Other things that challenge the theory of the rational man are human “errors” like emotions, selective perception and simple cognitive models. Time limitations in a hectic lifestyle will also limit our capacity to make processed decisions. All of this points to a limitation of human rationality. Mullainathan & Thaler (2001) wrote “Since we have only so much brainpower and only so much time, we cannot be expected to solve difficult problems optimally”. “Bounded willpower captures the fact that people sometimes make choices that are not in their long-run interest” (Etzioni, 2011, p. 1109). Simon (1955) suggested the term “bounded rationality”, to describe a more realistic conception of human problem-solving abilities. He was an early critic of the idea that people have unlimited information-processing capabilities. He stressed the fact that we are all limited in how fully we can calculate our actions, and therefore how rational we can be in a complicated world. “We rely on the stabilities of our institutional environment, to be able to make reasonable and stable calculations about the consequences of our behavior” (Simon, 1983, p. 78).

Kahneman (2012) suggested there were two systems of thinking. System one is automatic and “unconscious”; it works with no effort or experience of willpower. System two is the processing system that requires attention and concentration. According to his view, many, if not most, decisions are made by the use of system-one thinking. The combination of intuitive choice-making and reasoning constitutes a paradigm, in contrast to the “rational choice” model (Kahneman, 2012). Skinner (1976a) speaks of rationality in *About Behaviorism* saying that all behavior is at first non-rational, in the sense that the contingencies responsible for the behavior have not been analyzed. And that a person may know what he is doing without knowing why he is doing it. This means that behavior may become conscious without becoming rational (Skinner, 1976a).

Surveying the past in anthropological perspective, I think it is clear that the major transformation of human social life have hitherto never corresponded to the consciously held objectives of the historical participants (p.288). Our ancestors, of course, were no less psychologically conscious than we are in the sense of being alert, of having thoughts and making decisions based on the calculation of the immediate cost/benefits of alternative types of actions (p. 289) I suggest that they were unaware of the influence of modes of production and reproduction on their attitudes and values and that they were wholly ignorant of the long-term cumulative effects of decisions made to maximize short-term cost/benefits. To change the world in a conscious way one must first have a conscious understanding of what the world is like. Lack of such an understanding is a dismal portent (Harris, 1977, pp. 288-289).

Behavior analysts would point to other variables affecting decision-making like internal states of rationality. The functional relation between decision-making behaviors and the environmental contingencies would more likely be the focus of interest. Selection by consequences will be further addressed. Subjects previously discussed are also contingencies effecting decision-making behaviors, such as discounting; the tendency people have to choose smaller sooner than larger later rewards, also social behaviors as conformity and control.

Control

The word control is to most people aversive, but the fact is that we are all being controlled by our surroundings, deliberate or not. Skinner defines control as “A behaves in a way which alters B’s behavior because of the consequences which B’s behavior has for A” (Skinner, 1953, p. 313). Despite different views on behavior, few would deny the fact that the world around us is important. The disagreement lies more in the nature of, or the extent control holds over us, but some control is obvious. Some theories of human behavior ignore

the action of the environment. The individual is subject to more powerful control when it is presented by two or more persons. Controlling practices acquire certain uniformity from the cohesive forces, which lead individuals to take part in group actions, and also in the transmission of the practices from one generation to another. The behavior of the individual is classified as either “good” or “bad”, therefore “right” or “wrong”, and is reinforced or punished accordingly (Skinner, 1953). Bad behaviors, which are punished by other people, generate the conditioned aversive stimulation that is associated with an emotional pattern commonly called *shame*. “The individual responds to this when he “feels ashamed of himself”” (Skinner, 1953, p. 325). Selfish behavior is restrained, and altruism encouraged by the culture. It is a conflict between the effect of group control, and the strong primarily reinforced behavior of the individual, but the individual gains from these practices because he is a part of the controlling group. Thus as a part of the controlling group, the individual is a subject to control, but is also engaging in similar practices in controlling the behavior of others. This usually reaches a balance for the individual in advantages and disadvantages, between selfish interests and the interest of the group. An important feature of any group is the extent to which it exercises control over each of its members (Skinner, 1953).

Control can be confused with abuse, and because it is often misused by people, it is associated with something negative or aversive. A feature of cultural practice throughout history has been the exploitation and dominance of certain groups. Authoritarian leaders, racial oppression or one ethnic group controlling and abusing another group, and male dominance and subjugation of women, are all examples of the abuse of control. The question of how to change cultural practices can raise legitimate concerns about the control of human behavior. It is natural to fear that a science focused on the modification of cultural practices could be used to the advantage of some and the (distinct) disadvantage of others. This risk must be admitted and faced squarely (Biglan, 1995).

An unfortunate example is the prevalence of punishment rather than reward as a means of control in many human cultures; punishment is easier to teach than reward and therefore can spread more quickly through a culture, even though ontogenic contingencies would probably favor reward over punishment if both began as equally well established cultural practices (Catania, 2001, p. 156).

Existing in a social environment makes it impossible not to be under some sort of control; we all control, and we are all controlled. “To refuse to accept control, however, is merely to leave control in other hands”(Skinner, 1953, p. 439). It is important to stress that the purpose of a science of cultural behavior should be used for the benefit of people, and the development and maintenance of practices that foster or promote the wellbeing and self-determination of groups.

The knowledge about behavioral processes that occurs within a culture (e.g. social behavior, verbal behavior, control), is essential when dealing with human affairs, whether it is behavior on individual or system level. It is important to understand the relevance of these behavioral processes regarding behavioral issues on a large scale, both in analysis and applied sciences. Going back to Skinner's utopian community, as described in *Walden Two*, and using that as an example, these behavioral processes should be the building blocks to design positive social environments which will select productive behaviors. What is productive behavior will be in accordance to the specific social setting (environment) in which the person or group of people behaves. However, other levels of selection might also be considered when dealing with cultural phenomena. The following sections contextualize cultural selection (or selection of cultures) as a unit of analysis as its own level of analysis.

Selection

Skinner (1981) suggested a science of selection on three levels, a causal model of selection by consequences. The first recognized level was natural selection, but the model also accounts for the shaping and maintenance of the behavior of the individual on a second level and on a third level for the evolution of cultures. The selectionist perspective connects behavior analytic theory to the knowledge of the biological basis of behavior. On the other hand, it connects, through this perspective, the knowledge of individual behavior within cultural phenomena and the selection of cultural phenomena in its own right (i.e. third level of selection). The first level of selection, natural selection, will not be further addressed beyond defining its unit of analysis; the focus will be on the third level of selection.

The hallmark of a selectionist view is the effect of the behavior, it is the consequences of the behavior that will determine its future occurrence (Sandaker, 2010). Each of the three levels requires some kind of variation that provides the raw materials for selection to find place. It is crucial to be clear about what gets selected and what does the selecting. On phylogenetic level it is genes, on ontogenetic level operants, and on cultural level cultural practices, that are the unit that are being selected. It is always the environment, regardless of level, that selects the unit. The environment of each organism includes other members of its own species. But it must also be noted that, “although humans are developing the capacity to modify the nature of selection, we should not regard selection as a purposive activity performed by organisms at any of the three levels: it is environments rather than organisms that select their responses just as environments select the offspring that survive” (Catania, 2001, p. 153). Skinner (1981) stated that the three levels of selection each has its own discipline the first, biology; the second, psychology; and the third, anthropology. Despite the different disciplines, we still have a unified science of human behavior, which builds upon the model of selection on three different levels. When we talk about behavior, it is important to see the whole picture. Understanding group behavior requires the understanding of operant

selection where in turn natural selection is the basis. The behavior of an individual is the result of genetic endowment (natural selection) and individual learning history (operant selection). Social behavior is the joint product of individuals interlocking, each of them with their individual learning history. Thus the model of selection on three levels enables coherence, as it builds on each other.

The Cultural Unit

A social environment is usually spoken of as the “culture” of a group. The term is often supposed to refer to a spirit or atmosphere or something with equally nonphysical dimension. Our analysis of the social environment, however, provides an account of the essential features of culture within the framework of a natural science. It permits us not only to understand the effect of culture but to alter cultural design (Skinner, 1953, p. 419).

Anthropologists often refer to the essential core of culture consisting of traditional ideas and their attached values. But when observing cultures one do not see ideas and values, but how people live, what they do, the customs and customary behaviors of a people. The “ideas” of a culture consists of the social contingencies, or the behaviors they generate, and its “values” are the reinforcing contingencies (Skinner, 1971, p. 128). Units should be defined as concrete entities, not abstracts.

It has for a long time been a notion of a cultural unit, and many different authors have suggested definitions, and names like; “mnemotype, idea, idene, meme, sociogene, concept, culturgen, and culture type”. The best known is the meme, first introduced by Dawkins in *The Selfish Gene* in 1976. Or other definition of meme, i.e.; the units of culture, as nodes in semantic memory, proposed by the theoretical biologist Charles J. Lumsden and Edward O. Wilson (1981), published in “The relation between biological and cultural evolution”, *Journal*

of Social and biological Structures, in 1985 (E. O. Wilson, 1998). “How can anyone presume to speak of a gene that prescribes culture? The answer is that no serious scientist ever has. The web of causal events comprising gene-culture coevolution is more complicated –and immensely more interesting” (E. O. Wilson, 1998, p. 148). The definitions (names) of a cultural unit, mentioned above, identify the unit with an abstraction possessing no specific properties. This includes Dawkins’ (1982) meme, which is a representation defined as a unit of information residing in a brain, and transmitted from brain to brain (Baum, 2000, p. 183).

Right or wrong will not be discussed here, but names, abstractions or schemas are just a diversion, and does not give us any tools in dealing with cultural phenomena. The focus is therefore on the things we can observe, manipulate, measure and empirically test. With behavior this is possible. Baum (2000) said that cultural units are behavioral, and defining them as behavioral gives us a better picture of how cultural variation, transmission, and selection works (Baum, 2000).

Skinner (1981) defined cultural selection as the evolution of culture, and as the evolution of social environments or cultures. He did not talk much about the *unit* of analysis on cultural level, but he has stated: “there is clearly a question about what exactly is being selected ... Within a given group, the answer seems to be practices” (Skinner, 1988, p. 36). A suggestion that the essential unit of cultural evolution is the *permaclone*, was made by Glenn and Malagodi (1991). This is a term from Harris’ (1979) cultural materialism, and is described as repeated instances of behavior (a scene) by a group of individuals, which are transmitted and evolve gradual over time (Mattaini, 1996). Mattaini was referring to this when he said it was reasonable to use the term “cultural practice” to refer to an operant transmitted (and often maintained) by a culture. He believed this definition to be consistent with both Skinner's and Glenn's usages (Mattaini, 1996). Glenn (Vichy, Andery, & Glenn, 2009) however went further in the analysis of cultural contingencies, by the metacontingency. This

was a distinction between contingencies at the behavioral level of analysis (contingencies of reinforcement) and contingencies at the cultural level of analysis, defined as metacontingencies. The metacontingency Glenn (1988) described, consists of the relations between interlocking behavioral contingencies, aggregate product and a receiving system. “A scientific analysis of cultures cannot be reduced to the behavior of individuals because cultural practices, even though comprised of the behavior of individuals, have outcomes of their own - outcomes that affect the survivability of the culture”(p. 162), “a science of culture focuses on relations between recurring cultural practices (i.e., interrelated behavior among individuals) and the environments in which those practices occur”(Glenn, 1988, p. 161). Houmanfar and Rodrigues (2006) pointed out that the antecedent, as in the behavioral contingency, an environmental factor, were lacking in Glenn’s description of the cultural contingency. They suggested replacing the first term in the metacontingency, and let the cultural milieu of a culture be included in the first term of the contingency. This was in order to better preserve a parallel between the two types of contingencies, the behavioral and cultural level of analysis. Thus the metacontingency suggested by Houmanfar and Rodrigues consists of the relation between; cultural milieu, aggregate product and receiving system (Houmanfar & Rodrigues, 2006). This can be considered a parallel to the three-term contingency of operant behavior.

Biglan talked about a paradigm (Biglan, 1995), a contextual focus on prediction and influence, which is firmly rooted in the behavior analysis and biology, and that is consisted consistent with the anthropology of cultural materialism (Harris, 1979). He advocated the application of existing methods to the analysis of influences, but with the focus on changing cultural practices. The typical social challenges involve problematic behaviors, and therefore it is only natural that we address the question of how to change the incidence and prevalence of behavior. Given the role of organizational actions in our society it should therefore be a

small additional step to begin to analyze the context for their actions and how they might be influenced for the benefit of society. “I advocate no new methods, but rather the application of existing methods to the analysis of influences on cultural practices. If I advocate anything new, it is the focus on changing cultural practices” (Biglan, 1995, p. 432).

This article defines the unit of analysis on cultural level of selection as cultural practices. A cultural practice is the product (or aggregate product) of individuals interacting (interlocking behavior). This is considered consistent with Skinner (1988), Glenn (Vichy et al., 2009), Biglan (1995), and Houmanfar & Rodrigues (2006) i.e.).

Mattaini (1996) wrote that Skinner (1987) defined culture as *the contingencies of social reinforcement maintained by a group*. He pointed out: “this is an extremely inclusive definition, and it was probably meant to be. From this perspective, much of social behavior, including most verbal behavior, falls within the purview of cultural analysis” (Mattaini, 1996, p. 258). Glenn (1988) pointed out that the behavioral view is that a cultural practice is a set of interlocking contingencies of reinforcement in which the behavior and behavioral products of individuals function as environmental events with which the behavior of other individuals interacts. And that the behaviorist vision must be expanded, before a synthesis can be undertaken, cultural practice must be understood at the cultural level of analysis. A distinction must therefore be made between the two if the selection of cultural practices is to be considered a third kind of selection (Glenn, 1988). There are still some disagreements on the subject of the unit of analysis on cultural level of selection, in particular between those who focus on operant behavior and those that advocate for a distinct unit of cultural analysis. Different interpretations, not having a clear or unified definition and same focus, may be one of the most apparent challenges the behavior analysis have had in the interest and development of a science of culture.

Challenges for Change

Change is often a “painful” process which individuals frequently oppose. The challenge can be to find lenient and less intrusive ways to conduct interventions necessary to deal with the challenges at hand. People like to feel in control of their life; the ability to make decisions, and to have options, is crucial for the feeling of freedom. As mentioned before, people’s behavior is under control of their environment, this being their closest relations, their work place, their community, national laws, and so on. Ways to make change more lenient is through positive reinforcement and choice architecture. Behavior analysis has the focus on positive reinforcement of desired behaviors, instead of punishing undesirable ones. The theory of nudging (Thaler & Sunstein, 2008) offers a way to intervene in choice-making behavior, by nudging or prompting individual behavior, while maintaining freedom of choice. This will protect people from own mistakes, but also impact the system level, i.e. as when people take care of their health, it will also have a socio-economic advantage. If we use choice architecture to influence choices we can intervene in social environments at operant level. The environment selects cultural practices as it selects operants. This means cultural practices also can be shaped through reinforcement. A science of culture should investigate effective ways of change on system level, to alter cultural evolution.

A science of intentional change need not compromise norms of respect for the rights of individuals. Indeed, the importance of consensus decision making for groups to function as cooperative units accentuates the need for democratic processes to formulate benign social policies (D. S. Wilson, Hayes, Biglan, & Embry, 2014).

Simon (1983) stated that success depends on our ability to broaden human horizon so that people recognize that their fate is bound up with the fate of the world. The ability to live in a harmonious way with our total environment depends on a wider range of consequences. It is good to have faith in the belief that realization will change peoples ways, but rather than

wait for people to “wake up” something concrete should be done about behaviors that are bound up with the fate of the world. We need to link future consequences to present behaviors, and arrange for reinforcement for behavior that is better in the long run.

We are being asked to do something about the future. But the future does not exist. It cannot act upon us; we cannot act upon it. We speak of the future when we say that we act with a purpose – but purpose is no longer an acceptable scientific principle (Skinner, 1987, p. 2)

Sometimes we need the arrangement of variables to bring consequences more contingent on behaviors. Skinner (1987) said the future cannot operate on our present behavior; this is because time has a decreasing effect on reinforcing contingencies. Our knowledge about self-control and discounting can be used to deal with challenges to our future wellbeing. This requires massive, coordinated efforts among organizations and nations. “Our understanding of the future-oriented behavior of individuals is vital to understanding and affecting collective action. However, we also need an effective analysis at the level of actions of groups, organizations, and even nations”(Biglan & Barnes-Holmes, 2015, p. 5).

When we talk about selection, it is important to be aware of the fact that what could be advantageous on one level could have adverse consequences on another level. Individual interests may not correlate with the greater good, and cultural outcomes may not always be the best for the individual. For example cultures may induce individuals to suffer or die as heroes in war, or as martyrs. The structural similarity of the three levels does not attest to a common generative principle (Skinner, 1981).

What is good for the individual or culture may have bad consequences for the species, as when sexual reinforcement leads to overpopulation or the reinforcing amenities of civilization to the exhaustion of resources; what is good for the species or culture may

be bad for the individual, as when practices designed to control procreation or preserve resources restrict individual freedom; and so on (Skinner, 1981, p. 504).

Climate change and terrorism are on the agenda of everyday newscasts, but so far there seems to be little success in dealing with these challenges. “Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems” (IPCC, 2016). In spite of the existing consensus about the effects of climate change, little has been done to prevent further warming. Population growth is also surpassing the carrying capacity of our environment, without getting sufficient attention, and organized efforts to reduce growth are lacking (Biglan & Barnes-Holmes, 2015). Throughout history the world's population has been regulated in different ways, such as epidemics, wars etc. Also societies regulated themselves in different ways. One way to deal with these challenges was infanticide, especially female infanticide, as a solution to the Malthusian dilemma (Harris, 1977). Although still practiced in some parts of the world, this is highly unacceptable in modern cultures. We have evolved towards more humane societies, with a high focus on aid, progress in medical science, and also a decrease in warfare, which has led to growth of the world population. We can look at this as a result of kin selection, shaped and maintained by the contingencies of reinforcement arranged by those advantaged by the behavior, and so evolved to cultural practices.

It can be a problem to influence governments and organizations to adopt policies for change. The policies of governments in democracies are ultimately selected by survival; there is no survival in adopting policies that lead to elected officials being voted out, or political parties not being reelected. “At least in the current American democracy, government policies tend to be selected that are favorable to well-organized constituencies with the resources to affect the outcomes of elections” Hacker & Pierson, 2012 (as cited in Biglan & Barnes-

Holmes, 2015, p. 9). This can lead to short term contingencies and important decisions about the future are being held back because of their invasive quality. In smaller cultures like organizations, decisions are often made for the short term, as when the board of directors is under pressure to show good results (survival), and decisions such as for instance downsizing can make immediate results, but may not be profitable for survival in the long run.

Policies might be more easily achieved, if it provided incentives for doing such an analysis rather than imposing penalties for not doing it. Many organizations are dedicated to acknowledging the applicable challenges, like the exhaustion and destruction of a livable environment. The problem, however, is that their protests usually are directed toward governments and economic systems, and there they stop. “Moreover, the principal modus operandi of these organizations is to frighten people rather than offer them a world to which they will turn because of the reinforcing consequences of doing so” (Skinner, 1987, p. 13). Almost everything is being controlled by laws declaring what not to do, and enforced by taxation, penalties, and imprisonment. There is little attention to the fact that there exist different methods, and that we actually have a science about complex human behavior. Through positive reinforcement, it is possible to make the life of individuals better at the same time as meeting the interests on system level, this being saving the environment, or dealing with challenges in our community, nation or globally.

Conclusion (A Science for Analyzing Cultural Selection)

Perhaps if a small number of scientists begin to devote their efforts to build a science for changing cultural practices, science will finally learn how to bring about a world in which all people are productive, clothed, fed, cared for, respected, able to make important choices, able to learn, and able to love (Biglan, 1995, p. 432).

Is it enough to analyze individual behavior when we want to know something about the evolution of cultures? There are those in the behavioral science that find the operant terms adequate to explain behavior on cultural level. Others find it beneficial to have a different conceptual tool for the system level. There are different ways to explain cultural selection, and new terminologies and analysis have been suggested and tested in experimental and applied settings. Since there is much disagreement on the subject, there has not yet been established one coherent conceptual model. The three-term contingency might be adequate to analyze and explain group dynamics, but it makes the distinction between ontogenetic and cultural level unclear. It is important to be precise about the unit of analysis. At ontogenetic level, the unit of analysis is operants (operant classes), which is individual behavior; on cultural level the unit is the cultural practices. Skinner also specifies the difference between operant and cultural level of analysis, as the behavior of individuals and as evolution of cultures, or the evolution of cultural practice (Skinner, 1981, 1988). The unit of analysis in cultural selection has been explained in different ways, for example as an analog to the operant, and that the units passed from one group member to another could be explained by looking at behavior in context. Thus, like operant units, a cultural practice consists of three terms: (a) a context or discriminative stimulus (S^D) like a model or a rule, (b) the effective behavior, (c) its consequences, which is the outcomes produced by the behavior in that context (Baum, 2000). This because it points to phenomena that are directly observable and measurable, as opposed to evanescent units (e.g., ideas) whose nature is controversial and variable in interpretation (Catania, 1995). Since it is behavior we are looking at, also at the cultural level of analysis, it can be tempting to want to analyze it the same way as operants, but the model of selection distinguishes cultural selection as a third level.

Cultures consist of individuals behaving in groups, and it is the interlocking (interaction) of its members and the joint product of that interlocking, which consist of more

than individual behavior, that is the cultural practice. Looking merely at the operant behavior of each individual will not be enough in addressing the cultural contingencies. Glenn (1988) stated that behavior analysis focuses on individual behavior while cultural materialism focuses on group action. Group actions or patterns can be viewed as being composed of individual behaviors, and therefore, individual behavior may be regarded as the substrate of cultural practices (Houmanfar & Rodrigues, 2006). However, it is important to recognize that the two approaches of behavior analysis and cultural analysis have their own units of analysis and their own principles. "The goal of an interdisciplinary perspective on cultural practices and entities, therefore, is not reduction, but rather clarification of the relationship of phenomena across the two levels of analysis" Houmanfar, Hayes, & Fredericks (2001) (as cited in Houmanfar & Rodrigues, 2006, p. 14). It can be useful to search for analogs of operant processes at the cultural level, but to view cultural evolution as the mere transposition of operant selection, prevents us from recognizing that a new set of features of selection processes may take place in complex interaction of social groups (Tourinho, 2013).

Skinner (1981) argued that operant conditioning is selection in progress, and that it is the only of the three that occurs at a speed at which it can be observed from moment to moment. In biology and cultural studies, the biologists and anthropologists look at the processes through which variations arise and are selected, and it is only a reconstruction of the evolution. The immediacy of operant conditioning has certain practical advantages (Skinner, 1981). All the knowledge and research conducted on behavior (operant selection) can be used to make basis for a conceptual premise of system level operandi of change, for example, the knowledge of self-controlled behavior and future orientation, and the contingencies of reinforcement. Practices are selected by consequences, without regard to their long-term impact. "The fundamental issue in evolving more effective future-oriented action is to bring long term societal consequences to bear on existing practice" (Biglan & Barnes-Holmes,

2015, p. 7). Skinner's argument that only operant conditioning is selection in progress is true in that context. But in many ways, some mentioned above, there are ways we can use scientific methods to impact cultural selection. It can be argued that cultural practices also can occur at a speed at which it can be observed from moment to moment. We can collect data before and after interventions or change in contingencies, which are conducted to change cultural practices. By the knowledge of behavior analysis, we can take cultural studies into a laboratory setting where we can control most of the confounding variables, and with scientific method manipulate the independent variable and see the result in the dependent variable. For research we can use a laboratory setting to make microcultures, and investigate cultural phenomena and how the environment selects the cultural practices. However, real life situations are almost always more complex, there are more variables and many may be unknown.

In the field of human behavior, particularly in the design of culture, we must recognize a kind of complexity in the face of which the rigor of a laboratory science cannot be maintained. But this does not mean that science cannot contribute to the solution of crucial problems (Skinner, 1953, p. 434).

Behavior analysis has come far in investigating and planning for ways to address behavior on cultural level, and have the tools to do so. *Selection by Consequences* (Skinner, 1981) contributes to bridge the gap between the tree levels and makes it possible for behavior analysis to take part in all levels of analysis. "Even if not following a clear path, behavior analysts are already using this integrative approach and opening new research areas, as well as developing new models for analysis and intervention"(Couto & Sandaker, 2016, p. 58).

We have come far in the behavioral science of investigating and understanding complex human behavior, also when it comes to cultural behavior. Empirical data and well-

validated examples of managing behavioral and cultural change at scales ranging from individual to large populations have been provided by the applied behavioral sciences. The problem is only that this is mostly unknown beyond their disciplinary boundaries. The reason for this is possibly linked to the lack of a unifying theoretical framework, and we are close to a science of intentional change, once the many branches of the basic and applied behavioral sciences become conceptually unified (D. S. Wilson et al., 2014). This starts by clarifying the unit of selection of cultural analysis, so it can be operationalized and tested through empirical research. By substantiating the premise, we will have a science of culture.

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Article 2

**Effects of Contingent Consequences on Group Practices and Individual
Behavior in a Reversal Design**

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Abstract

In behavior analysis, cultural practices can be considered the unit of analysis on cultural level, within groups (Skinner, 1988). To test the premise, a model of selection by consequences, cultural selection can be researched in a laboratory setting, as there has been a long tradition for on operant level. Two experiments were conducted for this purpose, addressing the concept of cultural selection. In experiment 1, six groups of four participants worked together. Practices of choice making (dependent variable) were selected by feedback given by the experimenter (independent variable). The practice consisted of the interlocking behavior of the individuals in the group and their choice as aggregate product. In experiment 2, nine participants performed the experimental task individually. In each experimental trial, for both experiments, it was presented pictures showing a person behaving in everyday situations with four text alternatives, two describing the person in the picture and two addressing the surroundings (environment). The experiments (groups and individuals) were conducted as a within subject, ABAB reversal design, with two experimental conditions defined as *person* and *environment*. The participants were scored in accordance to right choices determined by the condition, and were given feedback contingent on each trial. Results showed that the environmental consequences selected group practices the same way observed on operant conditioning, and that groups were more effective in the experimental task (i.e. scored more points and were more sensitive to changes in conditions) at a statistical significant level.

Keywords: Culture, selection, environment, individual, group, interlocking, practice, experimental microculture

An Experimental Analysis on Cultural Level

A substantial part of our behavioral repertoire is acquired through interactions with family members, friends and neighbors, or in the formal context of educational institutions. The model of “selection by consequences” (Skinner, 1981) is a conceptual tool that helps us describe and predict how the environment operates on behavior. Variation is a prerequisite for the selection of behavior. This means that behaviors must exist within a range of possible (behavioral) variation, with respect to environmental interaction, to be selected (Sandaker, 2009). When we talk about cultures, we are focusing on more than the operant of an individual; it depends on the selection of practices and how behavior is transmitted from one individual to another, for example preparation of food and ways of raising children. In sum,

A culture evolves when practices originating in this way contribute to the success of the practicing group in solving its problems. It is the effect on the group, not the reinforcing consequences for individual members, which is responsible for the evolution of the culture (Skinner, 1981, p. 502).

A new participant of a culture is instructed and the behavior is shaped by those already involved in the practice, this being a new employee, a new student, a new parent, a new member of a social group, a new citizen, and so on. Thus, the behavior of the new participant is in part a function of those contingencies provided by others.

To specify and be parsimonious about selection, Skinner (1981) sums it up well when he says that human behavior is the joint product of, (a) “the contingencies of survival responsible for the natural selection of the species”, (b) “the contingencies of reinforcement responsible for the repertoires acquired by its members”, and (c) “the special contingencies maintained by an evolved social environment” (Skinner, 1981, p. 502). As both operants and practices involve relations between behavioral events and environmental changes, it can be

challenging to differentiate them in terms of selection processes. Cultural outcomes select interlocking contingencies of a cultural practice, but not directly the behavior of a participating individual. The behavior of any specific individual may have little effect on cultural outcomes, cultural processes and behavioral processes occur at different levels of organization (Glenn, 1988).

Specifying a theory of how cultural practices are selected is not enough if we are going to learn how to change cultural practices. Conceptual premises regarding how to achieve intentional change must be articulated and tested (Biglan, 1995). Conceptual analysis and interpretations are valuable components of an emerging science, but to make real contributions to addressing social, cultural and environmental issues the science cannot survive without data (Mattaini, 2006, 2009). Mattaini raised the question: “Will cultural analysis become a science?” in 2006, concluding that:

The most promising approaches, however, are likely to be consistent with those typically taken by the other natural sciences, relying on observational and experimental studies to help refine conceptual frameworks and test the hypotheses those frameworks suggest in a recursive developmental process (Mattaini, 2006, p. 79).

He suggested that the focus in the development of a natural science of cultural analysis should be on observational studies and simple experimental efforts to influence networks of interlocking contingencies, rather than continuing on efforts to refine abstract conceptual schemes without grounding it in data (Mattaini, 2006).

Responding to his own paper from 2006, Mattaini (2009) wrote the editorial introduction of the journal *Behavior and Social Issues* “The Data Are Coming”. He was referring to Todorovs (2009) experimental efforts on cultural level, and Vichi, Andery &

Glenn (2009) metacontingency experiment conducted in a laboratory, which was the first experimental study on cultural selection from a behavioral analytic perspective defined as metacontingency. Vichy et al. (2009) metacontingency experiment was inspired by other experimental traditions, such as experimental social psychology and experimental sociology, on social behavior and interaction. It was based on Wiggins (1969) experimental work on groups (experimental microcultures), investigating the effects of consequences external to the group as a whole. Wiggins' results indicated that the external contingency (environment) controlled the groups strategies (practice) (Vichy et al., 2009, p. 43). Vichy et al. (2009) conducted a reversal design experiment with two groups of four participants. The participants chose individually how many tokens to bet, and then collectively chose a row on a matrix with a plus or minus sign in each cell. The experimenter then announced a column that determined whether the group won or lost the bets. The trial ended after the participants had distributed their earnings. The distributing of earnings was the independent variable. They defined this as a metacontingency; which was the dependency between a given distribution pattern, the outcome (product) produced by the interlocking, and the winnings of tokens which was the cultural consequence. In experimental condition A, they won only after distributing proceeds equally on the previous trial, and in condition B, the winning criteria was unequal distribution. Group 1 was submitted to an A-B-A-B design and group 2 to a B-A-B design, where the experimental conditions were changed when the group reached the criterion of ten consecutive wins (plus sign in trials). The result of their experiments showed that the external contingency on distribution selected how the groups distributed their earnings. Also it showed that the changes were reversible, the behaviors of individuals and group patterns changed when the external contingencies (environment) changed (Vichy et al., 2009).

Azrin and Lindsley (1956) conducted a study on cooperation with 20 children, seven to twelve years of age, divided in ten groups of two children. An apparatus was designed for the experiments that required the two partners to make similar responses in order to receive reinforcement (a jelly bean) assuring group behavior. The groups participated in one experimental session divided into three consecutive periods consisting of (a) reinforcement period, with delivery of reinforcer on every cooperative response for over 15 min. In cases where the rate of response was not steady, the reinforcement was continued until five minutes passed with no noticeable change in the rate of cooperation. (b) Extinction period, with no delivery of reinforcement on cooperative responses for a period of at least 15 minutes (and until a steady rate of response for at least five minutes was observed). (c) New reinforcement period, making an ABA reversal design. The results showed that there was no prerequisite of specific instructions regarding cooperation, and that cooperative responses were selected, maintained, and eliminated by reinforcement like operant conditioning. It also confirmed that a reinforcing stimulus delivered to each member of the cooperative team was not needed; the presentation of a single reinforcing stimulus available to each member of the cooperative team, following the cooperative response, was sufficient to increase the rate of cooperation (Azrin & Lindsley, 1956).

Verbal behavior makes cultures possible; the relation between cultural and individual outcomes is often mediated by language. Some studies have looked at competition between individual- and group-level contingencies, and are described as a form of ethical self-control (Tourinho, 2013). Borba, Silva, Cabral, Souza, Leite and Tourinho (2014) conducted a study that also investigated the role of verbal behavior on ethical self-control (ethical behavior). They manipulated four contingencies within groups of four participants. In the first condition the members were individually distributing tokens without knowing what the others did. In the second condition the participants were exposed to the task together and could interact

verbally. In the third condition the participants were exposed to the task together and could interact verbally, but they did not have access to each others behavior. In the final condition, participants were exposed to the task together but were neither allowed to interact verbally, nor did they have access to each others behavior. The results of their study showed that the possibility of verbal interaction had more effect on the emergence of ethical self-controlled responses (choices that benefited the group), than access to the other participants responses (Borba et al., 2014).

Practices can be transmitted from individual to individual by imitation and instruction. Instruction is a verbal discriminative stimulus, it consists of rule-giving and rule-following (Baum, 2000). A rule is a verbal description of a behavioral contingency (Cooper, Heron, & Heward, 2007). Skinner (1969) defined it as a contingency specifying statement. Rule-based or instruction-based transmission occurs when an instructor states a rule (verbal S^D) and also reinforces the behavior appropriate to this rule. In the short term, behaviors of rule-giving and rule-following may depend on socially mediated reinforcement, but must ultimately enhance reproductive (repetition) success (Baum, 2000). Rule-governed behavior is behavior that is under stimulus control by a rule, which is a certain type of verbal discriminative stimulus. Rule-governed behavior involves two relations; a long-term relation (reason for the rule in the first place), and a short-term reinforcement relation for following the rule (Baum, 2005). Some extent of obedience is important in all cultures, and children are taught to obey adults. Parents who fail to teach rule-following are considered negligent, and a child who fails to learn to follow rules will have trouble adjusting to social life. Rule-following is therefore reinforced massively and repeatedly (Baum, 2000). Social skills are maybe regarded as the most important trait in a human being. This means the ability to function in a social environment, consisting of rule-following and learning history of reinforcement. Social skills are the same as sensibility to the environment and to the environmental changes; it is the

ability to select in accordance to the environmental conditions. “Rule-following, rule-giving, and rule-making are the key to understanding what the units of culture (practices) are, how they are transmitted, what function they perform, and how they are selected” (Baum, 2000, p. 194).

Baum, Richerson, Efferson, and Paciotti (2004) conducted a laboratory study on microsocieties as an experimental model of cultural evolution, where traditions (practices) of two sorts evolved; traditions of choosing, and traditions of rule giving or instructing. The microsocieties consisted of a group of four individuals, of which one of the participants was replaced approximately every 12 minutes with a naïve person. These replacements, which were defined as generations, continued for 10-15 times. The experiments showed that the groups developed choice traditions (practices) that tended toward maximizing earnings, and the stronger the dependence between choice and earnings, the stronger was the practice. When a practice evolved, the groups passed it on to newcomers; this was done by instructions with different combinations of information (accurate or mythology) and coercion (Baum et al., 2004).

The present study is an experimental analysis on cultural selection. It was conducted to address the basic principles of selection processes and test the conceptual theory that the environment selects the actions of a group, a cultural practice. At the same time, the purpose of these experiments was to test groups sensibility to the changes in the environment (adaption). This was accomplished by reversal of reinforcement between two experimental contingencies. By taking a cultural study in to a laboratory setting, we wanted to contribute to an experimental basis of a science of cultural selection grounded on behavior analysis and the conceptual contributions of Skinner (Skinner, 1953, 1981). In experiment 1, groups of four individuals (experimental microcultures) were exposed to a group contingency and had to agree upon one among four alternatives in a choice task. These choices were differentially

reinforced. The consequence for the agreed choice was programmed to test if a cultural practice would be established. The group contingency may be specified as the conditional relation among environmental antecedents (S^D) provided by the experimenters, the interlocking (interaction) and product by that interlocking (answers), and the cultural consequence, which was provided by the experimenters and defined as *environmental condition*. The independent variable was manipulated by the experimenters (environment), by changing the criteria for scoring correct on trials (dependent variable), in four experimental phases, making an ABAB reversal design. Experiment 2 was conducted to compare the experimental groups to individuals responding in the same task.

Experiment 1

Method

Participants

A total of 24 people, between the age of 18 and 50, participated in the experiment; 14 men and 10 women were recruited in Oslo, Norway. The participants were randomly divided into six groups of four individuals, with the two criteria that none of them knew each other in advance, and that none of them had previous knowledge about behavior analysis. No compensation was offered for the participation.

Setting and Apparatus

The experiments were conducted at the Institute of Behavioral Science, at the Oslo and Akershus University College of applied sciences in Oslo, Norway. The same conference room (figure 1) was used in all experiments, containing a large table with four chairs along one side and two on the other. Placed on the table fronting the four chairs, there was a 24" Samsung screen. In one end of the room there was a projector screen, and in the other end a camera

recording experimental sessions. Four computers, of the type HP EliteBook 840 were used, one connected to the projector controlling the pictures, one connected to the screen on the table used to give feedback and points, one used as a monitor for the feedback, and the last one to score the data from the answers given by the group. The table also held refreshments and food items in reach of the participants. Paper sheets were used in all experiments for back-up scoring. Four sets of laminated number cards, numbered 1-4, were made for the experiments. The program / slides had been specially developed for this experiment, and customized by the experimenters.

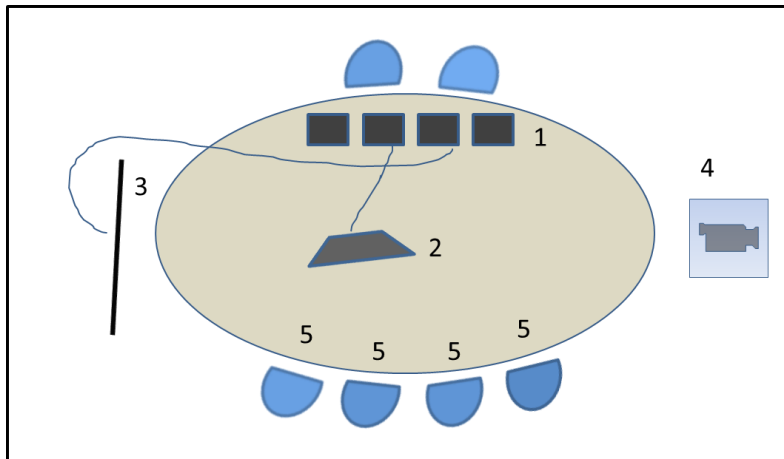


Figure 1. Experimental setting. 1: computers used by experimenters, 2: feedback screen connected to one of the experimental computers, 3: projector screen connected to one of the experimental computers, 4: video camera taping the experiments, 5: placing of participants.

Procedure

Each group of four individuals were seated together along one side of the conference table and told they were working together. The two experimenters were sitting on the other side, behind four computers, throughout the whole experiment. The participants signed a consent-form about participation and rights. Previous to the experiment the participants were only given limited information, and told they were to participate in an experiment about group

description of figures, and that the goal was to score as many points as possible. The participants were informed they would get debriefed after ended task. Instructions were given on the projector screen, and the experimenters clarified and answered questions regarding the text. The instruction was as followed:

Hello, Thank you for your participation! Now, you are going to work on an activity together. You will have access to slides. You are to choose the alternative that best represents the slide. There will be four cards with number 1 to 4 on the table and to each slide there will be four alternatives. You must agree on the answer that represents your impression of the picture and hold up the number that corresponds with the chosen alternative. The experimenter will check your answer and give you a community point if it is in accordance to the answers given by groups that went through the same experiment previously. *Guidelines: 1) You should choose the alternative that you think best represent the slide. 2) Do not think too much when choosing. Make it as fast as possible. 3) You are allowed to talk to each other at any time. 4) Avoid talking to the experimenter. 5) You must all agree on one alternative. All participants must choose the same. 6) The answers must be the same, but each participant should show his / her own answer card. 7) The answers will be checked after the trial time is over, and if they are compatible to the previous groups answer you will receive community points. 8) Try to score as many points as possible.*

Slides with a picture and text alternatives numbered 1-4, describing the picture, were displayed on the projector screen (see fig. 2). For each trial, a new picture showing a person act in everyday situations (like running, playing, working) was shown. The text alternatives were divided into two categories defined as, *person* and *environment*. Two alternatives were descriptions of the person in the picture, like characteristics or behavior, and the other two were related to the surroundings (like pleasant park, houses in the back, table, etc.). The same

set of 65 slides, were used for all experimental sessions, but the pictures and order of the text alternatives were randomized on different sequences for each group.



Figure 2. Example of slide, picture on the left and text alternatives describing the picture on the right, two describing the person (1 and 2) and two describing the environment (3 and 4). The numeration of the alternatives was randomized differently, as also the order of the slides, for each experiment.

Each participant was to choose one of the alternatives, by holding up a card with the correspondent number. In order to score points the four individuals of the group had to agree on the same alternative. The participants could freely talk amongst themselves at all times and discuss the answers. The picture display had a time limit of 60 seconds, but was cut short if the participants made their choice faster. After 60 seconds the picture was replaced by the text “your time is up”; in these cases they had to make an immediate decision.

The experimenter would give feedback to the participants chosen alternative depending on the condition criteria. Feedback were either “you scored 10 points” and a smiley face (Figure 3a), or “you did not score any points, please wait for the next” (Figure 3b).

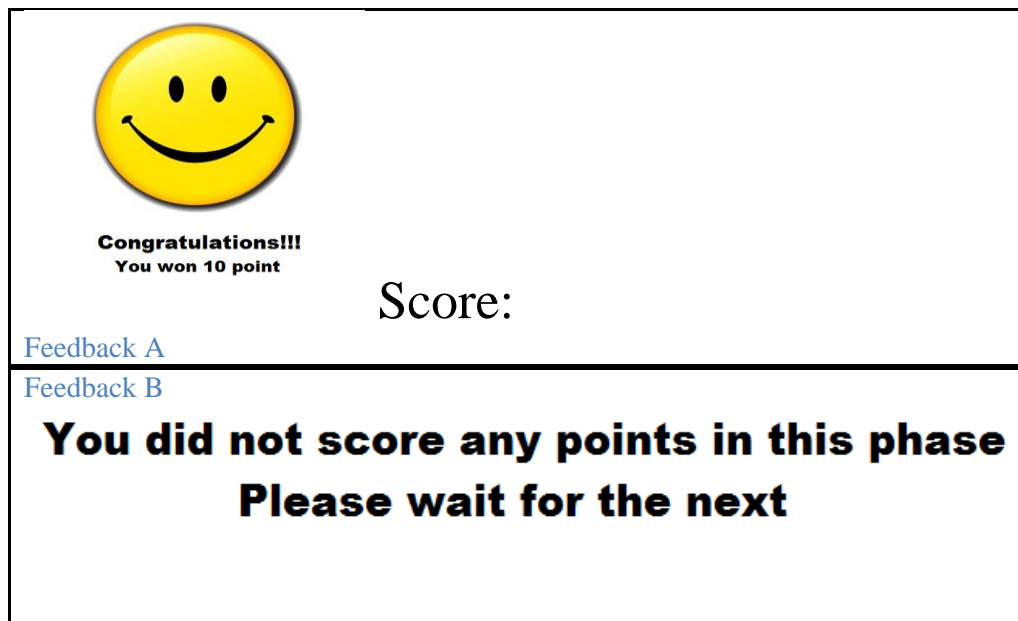


Figure 3. Feedback A and B. Feedback A was given right answers accordant to contingency, and points given on the right, showing the cumulative score, gaining 10 new points for every new “right” answer. Feedback B followed answers that were not in accordance with the condition criteria, and on the five test trials.

Experimental sessions. The 65 trials were divided into five experimental conditions. The first consisting of five trials (test condition), and the other 60 set up as an ABAB (reversal) design, containing 15 trials each. The test trials were used to register the group preference for one of the two categories (person or environment), and the answers in any of the alternatives would result in the message “You did not score any points in this phase. Please wait for the next” (Figure 3), and no points were added to the scoreboard. When the group had three or more picks regarding the person, the criteria for the first condition (A1) was set to *environment*, and when they tended to choose the environmental descriptions, the criteria was *person*. If the criteria for A1 were environment, the criteria were switched in condition B1 to person, again to environment in A2 phase, and then back to person in B2. For each trial, if the participants (group) choices were in accordance to the criteria for that phase, 10 points would be added to the score board.

Experimenter 1 controlled the slides projection, with one of the computers, and scored the data from the answers given by the group on the other. Experimenter 2 gave feedback and points with the computer that was connected to the screen on the table in front of the participants. The last computer was used as a monitor for the feedback, for both the experimenters to observe. The computers were on-line connected using google drive software. Experimenter 2 also scored the participants answers on a piece of paper.

The cumulative score was continuously shown in the right corner of the feedback screen. The experiment was conducted as an N=1, reversal design, so there was only one observation point (score) for the group as a whole. Every experiment was scored by both experimenters, the back-up score, noted on paper, functioned both as a control for the experimenter that gave the feedback and to compare the results, making a 100% IOA (inter observer agreement).

Experiment 2

Method

Participants

A total of 9 people, between the age of 18 and 50, participated in the experiment. Seven men and two women with no previous knowledge about behavior analysis were recruited in Oslo, Norway. No compensation was offered for the participation.

Setting and Apparatus

The experimental setting, location, equipment and placing, was the exact same as in experiment 1. The same six sets of 65 slides created for experiment 1 were used in experiment 2. In experiment 2 there were nine participants, thus the first three slides were used twice (for participants 1, 2 and 3 and 7, 8 and 9).

Procedure

The same limited information was given as in experiment 1. In the instructions, the participants were told to pick the text alternative that best described the picture, and that they were working alone. The individuals could talk aloud if they wanted, but the experimenters would not talk back. It was the same experimental procedure as in experiment 1, making an ABAB reversal design, with five test, and 15 trials in each of the four conditions. The criterions, scoring and feedback were exactly the same as for the groups.

Results

Figure 4 and 5 shows the cumulative score (successful trials) across the four experimental conditions for experiment 1 (groups) and experiment 2 (individuals). Filled markers show trials in which the defined stability criterion for correct answers occurred, whereas unfilled marks represent trials until met criteria. We considered that the stability criterion was met when participants scored five consecutive correct trials in a row; this process of selecting successful responses is also referred to as shaping in this article.

The graphs shows each participants (group or individual) sensibility to the feedback (points) and to the changes in the environment (changing of criteria in the different conditions), being the stated purpose to score points. Four groups (1, 3, 4, 6) and eight individuals (2, 3, 4, 5, 6, 7, 8, 9) started with criteria *environment* (as condition A), and only two of the groups (2 and 5) and one of the individual (1) started with criteria *person*. This means it was a noticeable preference for picking alternatives describing the person in the pictures (criterion person) in the test trials.

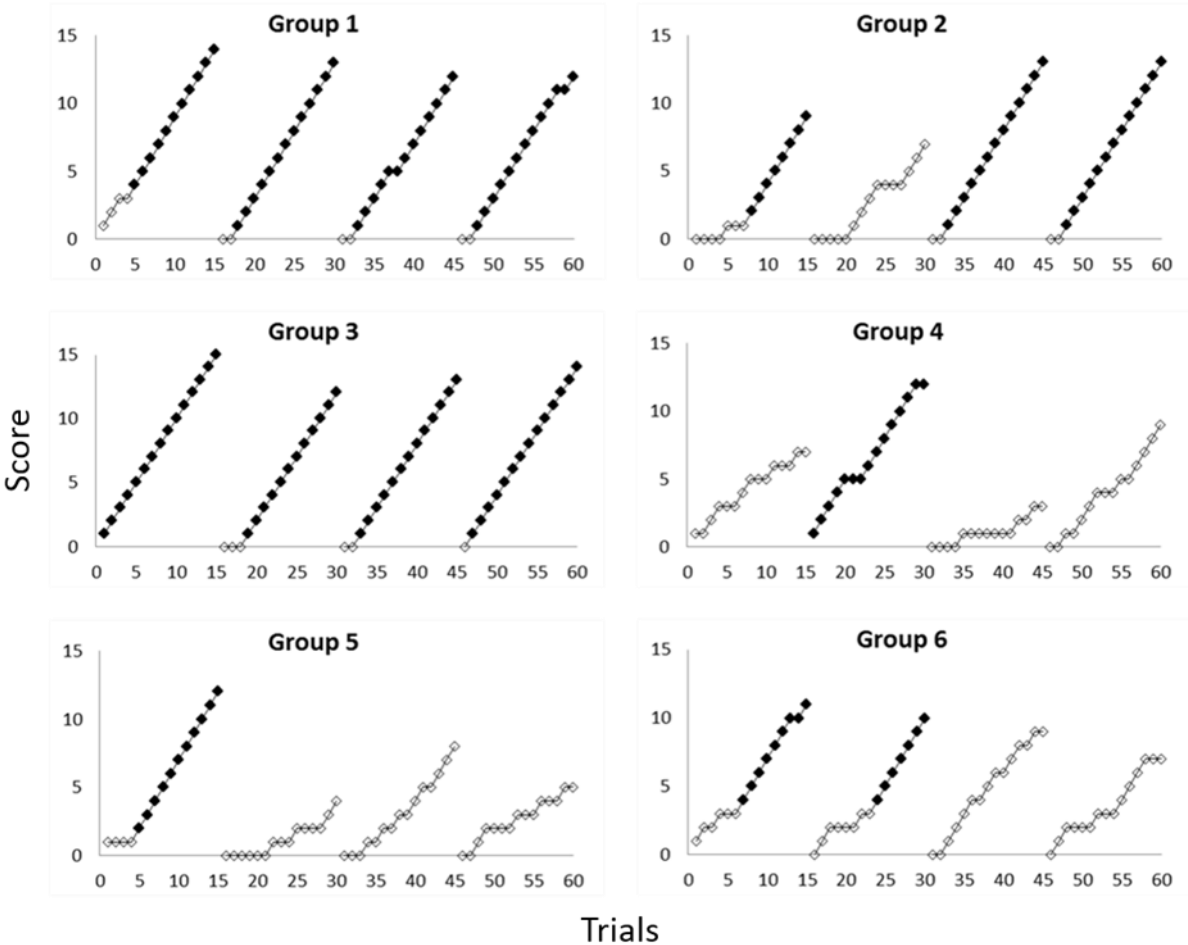


Figure 4. Cumulative successful trials for each experimental condition (A1, B1, A2, B2). Each panel depicts one group's performance (experiment 1). Filled markers show where the participants have reached the experimental condition of shaping (criteria of 5 consecutive correct answers) in that experimental phase.

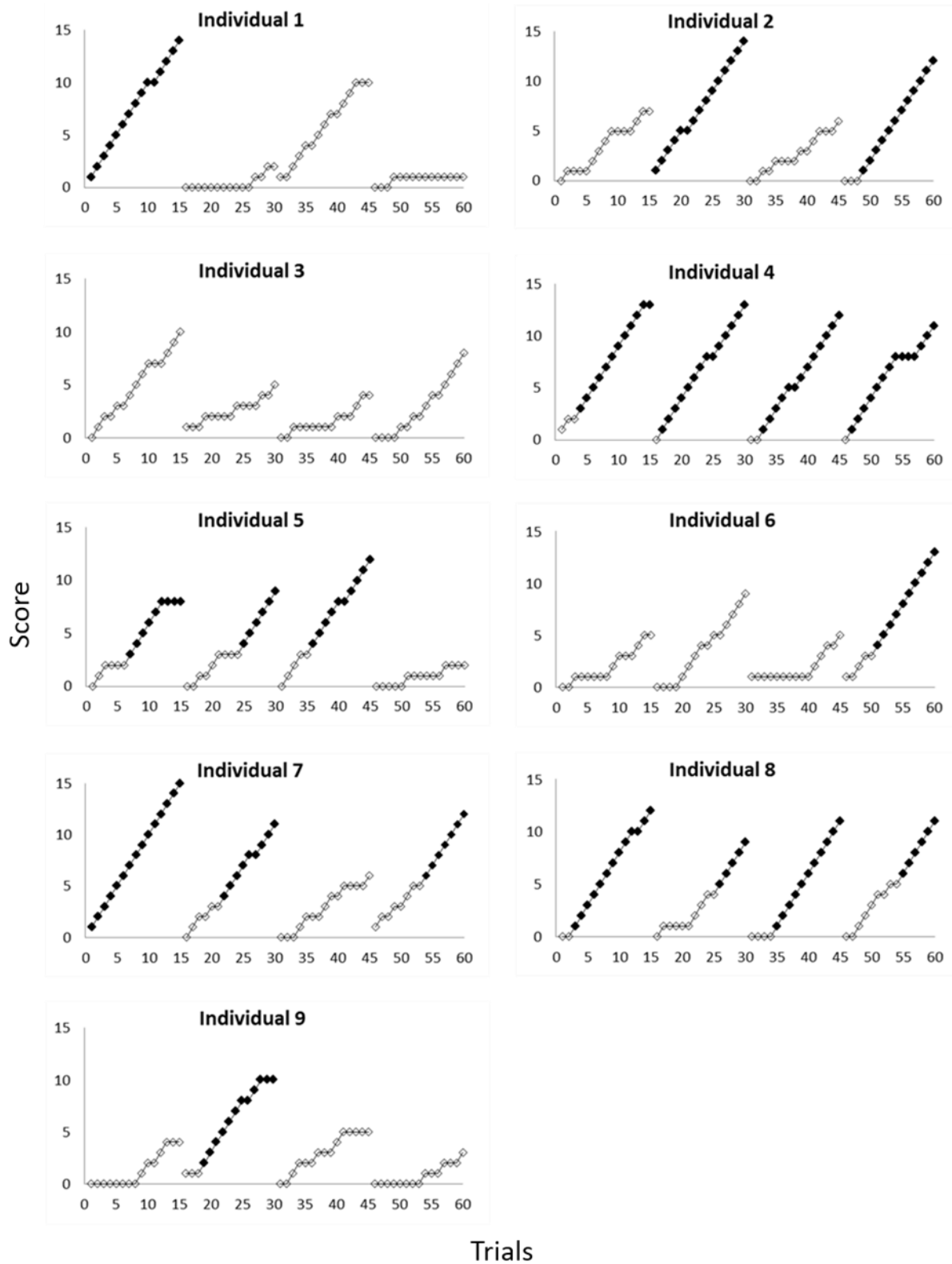


Figure 5. Cumulative successful trials for each experimental condition (A1, B1, A2, B2). Each panel depicts one individual's performance (experiment 2). Filled markers show where the participants have reached the experimental condition of shaping (criteria of 5 consecutive correct answers) in that experimental phase.

Two of six groups in experiment 1 (group 1 and 3) and two of nine individuals (4 and 8) in experiment 2 had a clear shaping in all four conditions. Group 2 also had a very clear shaping reaching three of the conditions, especially with the high amount of right trials in a row in A2 and B2 phase (end of experiment) and close to reach criteria also in B1. Individual 5 and 7 also reached the five-condition (stability criteria) in three of the phases, but are somewhat more unclear in the progression, especially individual 5 that has a very low score in the last phase (B2). Some of the individuals had a preference for one of the conditions (individual 1, 2 and 6) and the high score in these phases and reaching of stability criteria might be linked to that; referring especially to individual 1 that only had two right trials in B1 and one in B2. Only one of the participants (individual 3) did not reach stability condition in any of the phases, the rest (groups and individuals) reached criterion in one or two phases. Of these participants individual 6 stood out, showing a gradual shaping during the phases, and finally a clear reaching of criterion in end of B2 phase. In comparison, the individuals had generally more variation in the trials than the groups, which shows a correlation with the general score.

By these results it looks as if the individuals are not as quick in following the changes, and that the groups shows more sensibility to environmental conditions (in this case the program). Three of the six groups (50%), and three of the nine individuals (33%), had a clear shaping, according to the defined contingency, across both condition A and B (see figure 4; group 1,2 and 3, and individual 4, 7 and 8). The groups had a higher mean score than the individuals. The total mean for the groups were a score of 407 points, and the mean for the individuals were 345 points, of 600 possible, making a 68% and 58% score, which makes a ten percent higher score for the groups as a whole. The median score of the groups was 395, and the median score of the individuals 320.

Graphs representing groups and individuals scores were used to visualize the performance of each group and individual, and the difference between experiment 1 and experiment 2. The mean for each experiment was analyzed in order to test if difference between the experiments was statistically significant when comparing with chance. The analysis of average score also shows the change in score from start to end of the experimental phases, to determine the occurrence of shaping.

Analysis of Average Scores

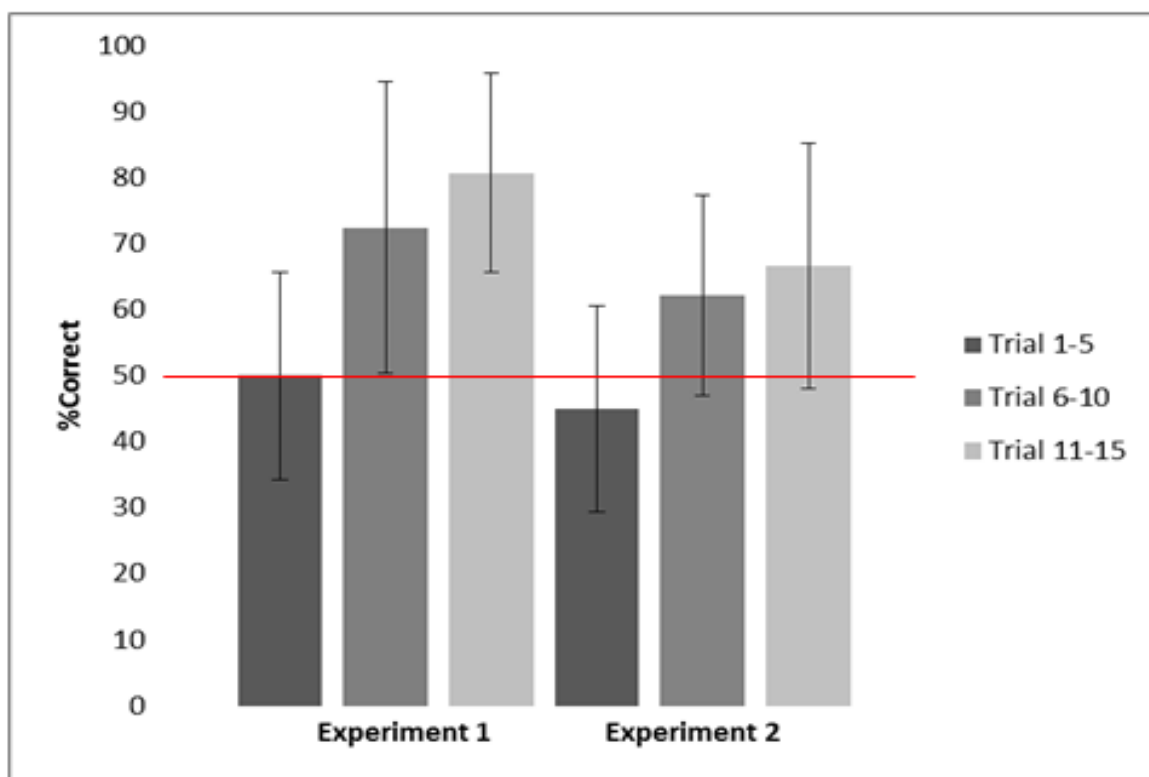


Figure 6. The average scores for first five, second five and last five trials of all four phases combined, for experiment 1 (6 groups) and experiment 2 (9 individuals), with error bars showing the spread in scores. The red line illustrates a 50% by-chance level.

The Statistical analysis (table 1) shows the mean and standard deviation of scores in experiment 1 (six groups) and experiment 2 (nine individuals). The average score across the groups (exp. 1) and individuals (exp. 2) are divided in three sets, containing the mean of trials 1-5, trials 6-10 and trials 11-15 of all four experimental phases. Furthermore the data sets of

both experiments were compared to a hypothetical group with a mean of 50% correct score, given that all other variables were equal, this to reflect a 50% *by-chance score*. The bottom row shows experiment 1 compared with experiment 2. The spread in scores can also be seen in figure 6.

The significance level was set at ($\alpha = 0.05$). Table 1 shows that even though there was a decrease in p from first five trials to second five trials and then to the last five trials, in all of the comparisons, only the average of the groups shows to be statistical significant at ($p = .05$) in last five trials (11-15).

The Cohen's d test suggests an effect size that is remarkable and that increases from the average first five trials, which is relatively low, to the next five and to the last five trials. These results apply in both experiment 1 and 2, and also in the comparison between experiment 1 and 2, and are consistent with other findings.

Table 1.

Data characteristics from experiments 1 and 2, compared to a hypothetical comparison group, and comparison between experiment 1 and 2.

Experiment	Trials	N	Mean	SD	t	p	Cohen's d
1	1-5	6	.5	0.158	0	1	0
	6-10	6	.725	0.221	1.761	.108	1.016
	11-15	6	.808	0.151	3.533	** .005	2.039
2	1-5	9	.45	0.156	-0.678	.507	-0.319
	6-10	9	.622	0.151	1.715	.105	0.808
	11-15	9	.672	0.185	1.966	.066	0.927
1 - 2	1-5				0.605	0.555	0.318
	6-10				1.079	0.300	0.544
	11-15				1.494	0.159	0.805

*Values shown to be statistically significant at .05 significant level.

** Values shown to be statistically significant at .01 significant level.

Discussion

The present study shows that the environmental contingencies operate on the group interaction as well as individuals (operant selection). In behavior analytic terms, this will be defined as selection by consequences (Skinner, 1981). As in Vichy et al. (2009) metacontingency experiment, the present results show that “the interrelated behavior of individuals in groups changes as a function of consequences upon the products of those behaviors” (p. 53) and that these changes are reversible as the patterns changes when the external contingencies (environment) change (Vichy et al., 2009). Present findings indicate that groups of people may be even more sensitive to the changes in the environment, compared with individuals performing the same task.

Individuals performing the experimental task alone tended to do very well (see individual 4, 7 and 8, in figure 4) or poorly (individual 1, 3 and 9). On the other hand, the groups generally performed overall better in the task and were more sensitive to conditional changes. There can be different reasons for this result, but variation can be the most relevant explanation. Even though participants of a group had the challenges of agreeing in accordance to the variation regarding decision making, a selectionist perspective can help us understand how this variation can also be advantageous. Diverse choice strategies would be tested, and the most adapted for the prevailing condition would be selected. Thus, the choice preference for some of the group participants would be selected for that condition, and with repeated exposition to the experimental contingencies the choice preferences of the other participants would also be selected. Baum et al. (2004) results also showed that group strategizing produced shifts in the choice making, either toward optimality, and also sometimes away from optimality. Group strategizing thus explains some of the variation in choice, which sometimes also led to a degree of instability (Baum et al., 2004).

We also observed the development of leader-follower relationships, as participants of groups who voted to the correct answers more often, would develop a leadership role within the group. In our experiment 1 (groups) the participants tended to take turn in deciding which alternative to pick, until one (or two) of them were more successful (picking alternatives that gave score) and stood out as a leader, and got the other participants attention for next trial. The ones that did not get scored on their suggestions tended to pull back quickly, indicating that the negative feedback in a social setting was aversive, and it had a punishing (decreasing) effect on their behavior. One can say that the other participants got under control of the “leaders” choice-making behavior in the future. In cases where one of the participants stood out early in forming a rule and getting scores, it was a quick shaping of the group practice (unit of analysis). A clear statement of contingency (right or wrong) followed by positive feedback and points established the rule. In the cases that the rule stated the right contingency, the group was very successful; even when the criterion was reversed, the participants were able to quickly change the rule to fit the new contingency. Azrin and Lindsley (1956) also observed the shaping of leader-follower relationships in their experiment.

After following the “leader” for some time, other participants also became sensitive to the contingencies and were able to discriminate. Verbal behavior provides a link between the contingency of behavior / practice; in this case the picking of alternatives, and the contingency of reinforcement. Verbal rules bridge the gap between behavior and future consequences and can therefore function as discriminative stimuli. Most individuals has a learning history of reinforcement for rule-following, and this could be the explanation why forming of rules can make a quicker shaping process, in that following a rule has been reinforced in the past, and also can be reinforcing in itself. Then again this would have no success without sensitivity to the reinforcing consequences; if the rule does not lead to success, the rule would be changed. Another challenge would be if the person that got the

skills to solve the task would pull back to more dominant individuals. In the present study, though, most of the groups started out in a fairly democratic way until someone was successful.

The practices (exp1) and the operants (exp2), picking one of the categories, person or environment; and not the other, were conditioned through differential reinforcement using feedback and points. When it comes to the reinforcing effect of the point's two main remarks should be made: (a) Points alone may not have a reinforcing value to some individuals. This can depend on earlier reinforcement of rule-following, earlier establishment of points as a generalized reinforcer and so on, mainly their learning history. Because the groups consisted of four individuals with four different learning histories of reinforcement, the groups would be more sensitive to this contingency (the points as a reinforcer). (b) The social reinforcing effect, amplifying the points. In the field of social behavior, reinforcers are usually followed by attention, approval, affection and submission, and because these stimuli are paired with every other reinforcers, attention from others itself becomes reinforcing (Biglan, 1995; Skinner, 1953). In experiment 1 we saw the groups making remarks, responding and cheered on as they got points. We also saw that the intensity in the discussion mediated the same intensity in the response to the feedback, and also an increase or decrease to the status of the one (or the ones) responsible for picking the answer. Some of the individuals in experiment 2 did not seem to pay much attention to the points; one of the individuals even said after the experiment that he tried not to be influenced by the points (individual 1). In sum, it can be assumed that the groups (experiment 1) in general were more sensitive to the points than the individuals (experiment 2), and that the social setting amplified the reinforcing effect of the points. It is important to be aware that the feedback of right and wrong in itself can function as differential reinforcement and therefor shape the behavior (practice / operant), the presentation of points was to strengthen the feedback on right trials as a reinforcer.

A comparison to a 50% score in the statistical analysis can be right considering there was a 2/4 chance of right score, but the complexity of the task could have an impact on the scores. The few number of trials in each condition can be a reason the percentage scores were not higher, the variability was generally higher in the start of each phase, and because many of the groups and individuals reached a stability of criterion at or towards the end, one can hypostatize that it would increase even more the longer they would continue. Azrin and Lindsley also saw that the variability was greater during extinction than during reinforcement in their cooperation experiment (Azrin & Lindsley, 1956). From variability new practices can be shaped; variation, selection and replication are the basic components in the selection process. Thus, a 100% correct score would not have been possible because of the reversal in contingencies; there had to be incorrect score for the participants to be in touch with the environmental change. Group 3 (see figure 4) had a perfect shaping, and this may be the highest possible score where we can know it was the environment (reinforcement) and the sensibility to the environmental changes that selected their choices (practice).

Although Skinner (1981) postulated that individual level of selection is the only level that occurs at a speed at which it can be observed from moment to moment, there has been argued that we also have that possibility with cultural practices. The laboratory microsociey experiment is a flexible tool for examining many aspects of cultural transmission under controlled conditions, and experiments may contribute to understanding the basic processes of cultural evolution (Baum et al., 2004). “In any field of science, one begin with facts that can be predicted and controlled with some precision and then moves on to more complex facts only when the increasing power of the analysis permits” (Skinner, 1987, p. 9). At this point we should be aware that behavior analysts have the tools to take part in functional analysis encompassing all levels of selection (Couto & Sandaker, 2016).

The present results indicate that cultural practices are selected by the environment on equal terms as operants, i.e., and also that cultural selection can be taken into an experimental setting and be observed from moment to moment as with operant conditioning (selection). It also indicates that groups of people interacting (selection of cultural practices) are even more sensitive to environmental contingencies and changes. More studies should be conducted to increase the generality of the present findings. At the same time, the importance of rule-governed behavior in the forming of, and maintaining a cultural practice, could be tested. Further studies should investigate the transmission of the cultural practice to new members, and if this would interfere with the sensibility to environmental changes. The same experimental design and setting could be used, with the manipulation of replacing one by one member of the group.

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