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Growth Mindset and the Capacity for Learning

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Growth Mindset and the Capacity for Learning

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Abstract

The topic pertaining to motivation has been a theme that has had long history within scientific research. A number of theories have tried to dedicate themselves in the investigation of this phenomenon. One such field that has had a steady increase in the last years is Mindset theory. Mindset offers a model that aims in explaining how the types of goals that are chosen by an individual results in the exhibition of specific behavioral patterns. The theory has been utilized in a number of interventions aimed at changing behavior in various setting such as in schools and the organizations. Despite the spread of the theory, there seems to be evidence that it still needs to be developed. Data from 162 employees of different branches of a sporting goods brand was used to further investigate the effects of mindset on the key performance indicator (KPI) for sales growth. The results from the investigation showed high reliability, however there were no other significant co-variation between the elements of growth mindset in the organization and KPI sales growth. On this basis the current study aims to incorporate the perspective from both behavior analysis and neuroscience to further develop the theory of mindset.

Keywords: mindset theory, behavior analysis, neuroscience, verbal behavior, growth mindset, fixed mindset

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Introduction

The ability to describe and record a past event and further pass it on to other individuals is an important trait that humans possess, this is made possible by what is called symbolic learning or symbolic behavior (Casadevall & Fang, 2015; Wilkinson & McIlvane, 2001). The passing down of information is done by the inheritance of various artifacts from previous generations (Moore, 2018). For this to be effective it requires that individuals are able to relate different spoken, written or signed words to each other, as well as emitting the responses during other non-trained situations or (emergent) relations. This aids to among others the functional communication aspect of symbolic learning (Wilkinson & McIlvane, 2001). In a number of areas related to human discoveries, systematically analyzing and organizing the formation of discoveries is a critical aspect of understanding the present.

Science aims to reach a thorough understanding of the phenomenon that is in focus (Cooper et al., 2007). In this inherent curiosity for the understanding of phenomena, science shares its origins with philosophy (Baum, 2017). Philosophy has as its main priority in the contemplation of the unknown and focuses on the events that science has yet to answer (Wilson, 1998). Despite the current strained relationship between science and philosophy that has been noted by Hawking and Mlodinow (2010), the cooperation between the two fields has had a pivotal significance that escalated the inquiry of knowledge (Baum, 2017; De Haro, 2020). Mirroring this, Wilson (1998) noted that philosophy has played a major role in the activity pertaining to intellectual synthesis. That is, the unifying of different scientific discoveries into one complementary framework (Creighton, 1896).

Early investigations that focused on understanding the inner workings of organisms, specifically humans, have been perpetuated by the hope that investigators may come to uncover the whereabouts of the soul (Habbal, 2017). All scientific fields were at some point consumed by the similar interest in uncovering the world as a matter of spiritual and

philosophic inquiry. However, as technological advances ensue, so did the separation between the field of philosophy and its scientific counterparts (Baum, 2017).

This made it important to develop a new branch that had its main focus on the incorporation between philosophical thinking and scientific practice. This integration resulted in the creation of philosophy of science. The objective here is to investigate the varying practices and activities that are needed for further generation of knowledge in science (Ankeny et al., 2011). This brought the focus back to epistemological reviews and ontological considerations that stem from these. Absolute knowledge that previously resulted in a divide between science and philosophy was here by cast out. And the focus was placed back into the actual review of practices rather than abstract concept that science could not be implemented or used (Ankeny et al., 2011).

As an example of this, the theory of blended inheritance conjured by Darwin was later replaced by Mendelian theory that proposed genetics to be the mechanisms that is responsible for inheritance (Porter, 2014). Further development of the scientific community and the methodology used to make inference on specific topics made it possible for the further discovery and verification of genes. Although genes were first discovered by Gregor Mendel in 1865 it did not receive any widespread attention until its rediscovery in the 1900. This rediscovery was to some credited to the microscopy that allowed for the further verification of the theory of genes as the main agents of transmission in reproduction (Gayon, 2016).

Including the further development of genetics aided by the invention of microscopy; the further development of the X - ray made it possible for Fridrich Miescher to isolate and observe the components that made up DNA (Dahm, 2005; Gayon, 2016). Similarly, research into human behavior, the structure of the brain and its function experienced the same historical background. The brain was first assumed to be an organ responsible for temperature regulation by the Greek. However, during the Roman empire research into animal models

revealed that it may play a bigger role in regulating temperament as well as other bodily functions (Gross, 2012).

Evolved Capacity for Learning

Development in microscopy as well as Golgi ink that was used to show isolated cells of the brain made it possible to further investigate the structure of the brain. Santiago Ramón y Cajal, noted as the father of modern day neuroscience, was able to draw and discover different forms of cells that existed in the brain (Garcia-Lopez et al., 2010). He also was the first to document changes that happened to the adult brain (Fuchs & Flügge, 2014). At this time such a process was called neuronal plasticity, and this discovery went against the earlier existing notion that individuals are born with, and within the early stages of their life cycle, attain a set number of neurons for the rest of the individual's lifespan (Fuchs & Flügge, 2014).

Neuronal plasticity or neuroplasticity can be defined as the process where the brain undergoes functional and/or structural changes for the purpose of adapting to different environmental influences (Nahum & Bavelier, 2020; Voss et al., 2017). Such changes are considered to underlie various processes of learning (Nahum & Bavelier, 2020). These changes have been observed to occur as a result of both biological and environmental influences (Fuchs & Flügge, 2014; Nahum & Bavelier, 2020). These changes can involve molecular regulators such as specific hormones that regulate gene expression which in turn affect neurogenesis (Bear & Paradiso, 2020).

Neurogenesis is but one of the various processes that facilitate for the brain's ability to adapt by creating new neurons in the regions that need them (Famitafreshi & Karimian, 2019). The process of neurogenesis in itself is divided into two phases, proliferation, and differentiation. Proliferation simply refers to the creation or development of new neurons in the brain. This phase can take between four to eight weeks. Differentiation refers to the assignment of specific functions. Neurons that have not been assigned a function will

disappear within four weeks after proliferation (Bambico & Belzung, 2013). A number of factors have been identified that affect the process of neurogenesis as well as neuroplasticity. Such factors include environmental factors such as physical activity, learning, and an enriched environment (Fuchs & Flügge, 2014; Bambico & Belzung, 2013; Nahum & Bavelier, 2020).

Knowledge pertaining to neuroplasticity has led to a number of therapies with the aim of improving brain morphology. Much of this has been focused in areas related to rehabilitation after trauma to the brain. Video games, physical therapy and various neurostimulation strategies are a few of the techniques that have been identified to help the reorganization process of the brain after trauma (Keci et al., 2019; Nahum & Bavelier, 2020). A number of interventions and programs outside the medical community have also been involved in the creation of strategies and interventions that aim to take advantage of peoples' ability to adapt to new situations. For the proper understanding of an individual's functioning, proper knowledge and investigation on its biological make-up and how it interacts with the environment is necessary (Battro et al., 2011). On the basis of this, research has shown that the interplay between biological processes, top – down, and environmental variables, bottom – up procedures, is what facilitate learning and the changes that appear as a result of this (Nahum & Bavelier, 2020).

What is Learning?

Learning can be defined as 'the acquisition, maintenance and relative stable changes of behavior that come as a result of an organism's interaction with its immediate environment' (Pierce & Cheney, 2017 p. 1). Learning plays an important role in brain related changes that result in complex behavior. Behavior can be defined as anything a living organism is capable of doing (Schlinger, 2015; Cooper et al., 2007). There are a number of different scientific approaches to the understanding of learning as a function of the interaction between an organism and its environment.

Behavior analysis is sometimes called the science of behavior and it has its major focus on behavior as an interesting subject in its own right, not as an indicator of inner variables. The main objective of the field is uncovering general laws of behavior and how these laws fare across different species and contexts. It is an objective to use these lawful relations to develop technologies that can be applied in non-laboratory settings in order to improve socially significant behaviors (Cooper et al., 2007; Pierce & Cheney, 2017).

The field of neuroscience and behavior analysis are assumed to be complementary, in that they mutually enrich each other, and understanding in one field can advance understanding in the other (Sandaker, 2006). Neuroscience and behavior analysis are both focused on the selectionist perspective (Donahoe, 2017). Within this perspective, any observed characteristic of an organism is considered to be result of processes of selection by the environment. This environment selects among a variation of differing properties, and the ones that are adaptive in the specific context are favored while others are selected out (Donahoe, 2017). The selected traits will also be replicated in similar circumstances in the future or within the next generation. Within neuroscience this is known as natural selection, while in behavior analysis it is called reinforcement (Donahoe, 2017).

Psychology is relatively young compared to other sciences. Within psychology a number of various paradigms reside. Different paradigms can produce differences in ontological considerations, and thus in preferred units of analysis. This in turn produces differences in epistemology, which concerns the best way to analyze and study the preferred units of analysis. All of this has resulted in different approaches to the investigation of different aspects of the experience an organism has, and the corresponding behavior that accompanies it. The separation of the branches or schools of thought can be described as different paradigms of how human behavior is understood (Hayes et al., 1988). Paradigms are models outlining basic assumptions about the world, that in turn guide what is and should be

observed (Hayes et al., 1988; Lee, 1983). The differing of paradigms results in different strategies for the investigation of the behavior of organisms, human or not.

Discourse between and within different branches has often emphasized antagonistic perspectives, especially between radical behaviorism and cognitive psychology. However, the disagreement that has often been seen in such debates can be boiled down to each field focusing on different paradigms that require a specific type of answer (Holth, 2013). One source of misunderstanding has been comparisons between mechanistic paradigm and a contextualistic paradigm. According to Hayes et al. (1986) and Pepper (1942), different paradigms (what Pepper calls world hypotheses) cannot be judged except on their own terms, because of their different aims and truth criteria (ontology and epistemology).

The mechanistic paradigm views the world and all its events as a machine. In such a view, we know the state of the machine at a specific point in time and the specific input that will occur. From this we may be able to predict with a certain level of certainty the state of the machine at a later point (Biglan, 1995b; Hayes et al., 1988). Within such a view, energy inputs affect the parts that end up affecting other subsequent parts, resulting in a specific output. Such theories aim at analyzing phenomena and finding events that can reliably predict the onset of specific other phenomena. The truth criteria from such a world view will thus involve precise description and correct prediction (Hayes et al., 1988). According to radical behaviorists, such a paradigm is common in cognitive psychology. Cognitive psychology is the foundation for generalized models of motivation, and such a model is said to have high predictive validity if the scores on measures of the units the model contains correspond to certain observable behaviors (Biglan, 1995a). The correspondence criterion of the truth validates mindset theory.

Mindset theory analyzes how specific inputs affect an individual's internal variables or parts, resulting in specific patterns of responding. Depending on the energy input that exist

around the individual they may affect specific variables within the individual. This will in turn result in the creation of specific types of goals that accompany a specific behavioral pattern (Elliott & Dweck, 1988). These internal variables can be seen as the type of mindset the individual has. Such models tend to have a certain degree of predictive validity. "Predictive validity refers to the accuracy of a test to predict specific types of behaviors" (Domino & Domino, 2006 p. 488).

Despite the advantages of the generalized models produced by fields that have a mechanistic view, certain weaknesses exist. Different paradigms have different scope and precision, scope referring to the number of events or experiences that are incorporated, and precision referring to the number of explanations that can be utilized for the events or experiences incorporated (Hayes et al., 1988; Lee, 1983). Even if theories in the mechanistic view can be generalized to a broad scope of experiences or events, the precision that is meant to explain the features of such events may require more deliberation. The contextualistic paradigm on the other hand investigates an event or experience with the accompanying context (Biglan, 1995a).

In the contextualistic world hypothesis, an experience is viewed as a whole and not separated from the events that surround in (Biglan, 1995a). This is why the act-in-context is an important aspect in contextualism. The act-in-context is an important root metaphor that guides knowledge generated from a contextualistic paradigm. This results in the idea that every behavior that occurs is a unique case, this further aids in the investigation of the variables that are at work in that specific context. This places an emphasis on the notion that behavior can be influenced on the basis of the specific consequences they produce. This corresponds to the definition of an operant that Catania (1973) offered. Here manipulable variables are incorporated for the purpose of achieving prediction and control (Biglan, 1995a).

A science that aims to uncover and understand what organisms do and how they adapt needs to investigate the function of behavior. The selecting environment is only in contact with the varieties of phenotypic characteristics that the organism emits (Skinner, 1981). Developing a framework for thorough understanding of behavioral causation requires fields such as neuroscience to investigate the emitted behavior and how it interacts with the environment (Engel & Schneiderman, 1984). This is exemplified in research that has shown how various neurotransmitters are triggered by the environment, and this how subsequently affects behavior. As Donahoe (2017 s. 306) stated; "The neural capability for widespread reinforcement effects of reinforcement is accomplished through the liberation and subsequent diffusion of the neurotransmitter dopamine." This is in accordance with other experiments which suggest that dopamine plays a role in certain aspects of stimulus control, with observations of how dopamine is released in situations that predict or are correlated with a coming reward or within the pursuit of said reward (Nahum & Bavelier, 2020; Donahoe, 2017).

Complementary Perspectives Under Selection Science

The incorporation of neuroscience in the analysis of behavior should not be considered as a replacement or justification for the discoveries within the behavior analytic field. For the interpretation of behavior, we only need to go as far back as is required to reach experimental control of the various variables that are under investigation (Hayes & Brownstein, 1986). However, what happens between the occurrence of a behavior and the variables that control it still is partly unanswered within the field of behavior analysis. Some argue that this is a domain that can properly be filled by perspectives that focus on the biological make-up of an individual, and neuroscience is one field that has often been proposed as such a perspective (Skinner, 1988).

Neuroscience can enhance the understanding of behavior by contributing more sensitive measures that will allow us to observe behavior that otherwise was covert and unobservable by other individuals (Ortu & Vaidya, 2016). This interdisciplinarity can be viewed as an important endeavour that may lead to important discoveries, which in turn may lead to the creation of useful technologies. As viewed in radical behaviorism, both events that happen within the organism's skin, as well as those that are observable by more than one individual, are considered behavior that can be affected by the same variables. Having tools that would allow for the analysis of covert behavior, such as an organism's neurological activity, may improve our understanding of how these responses relate to their environment. This may also improve our analyses of how these responses are elicited or emitted in relation to different conditioning procedures (Ortu, 2012).

The interaction between the environment and inner variables in an organism is discussed in *Selection by Consequences*, the seminal article by Skinner (1981), where he explains the behavior of organisms as resulting from three different levels of selection. Skinner suggests that these different levels interact to create the complex behaviors that we observe in organisms, and of the different systems that living organisms organize into (Moore, 2018; Skinner, 1981).

Phylogenetic, ontogenetic and cultural selection are the levels that Skinner uses to describe the causal mode to which an organism's behavior is established and maintained (Skinner, 1981). The phylogenetic level encompasses the forms of behavior that come about through the evolutionary history of the organism's entire species. This form of behavior is elicited by different environmental stimuli, and usually categorized as reflexes (Skinner, 1981). This level encompasses behaviors that are observed in respondent conditioning and seen as the main domain of fields such as neuroscience or biology.

Respondent conditioning is a field of study that was developed by Ivan Pavlov a physiologist who studied digestion in dogs (Rehman, 2020). Respondent conditioning encompasses stimulus control related to stimulus presentation; this means conditions not related to the consequences with which the behavior produces. Such responses are based on the genetic endowment of the organism and is related to the functions of various biological processes within an organism (Pierce & Cheney, 2017; Skinner, 1981). The autonomous nervous system (ANS) sets the occasion for reflexes. This part of the nervous system controls the physiological responses that are considered automatic and involuntary. Within the ANS, nerve fibers send the different inputs and outputs to and from the central nervous system (CNS) (Waxenbaum, 2020).

Despite the magnitude of so called ‘innate behavior’ that an organism inherits through the process of phylogenetic evolution, there exist certain limitations. Behavior formed through phylogenetic evolution or natural selection only prepares the organism for contingencies that resemble the environment that selected the behavior (Skinner, 1986). For organisms to adapt to an ever-changing environment, they are reliant on a variation of different responses that are established through and maintained by the specific consequences that they produce (Pierce & Cheney, 2017).

Operant conditioning refers to behavioral repertoires that are established by the effects the organism has on its environment (Moore, 2018), this is what Skinner termed ontogenetic selection. Ontogenetic selection refers to the various traits or behaviors that an organism acquires within the span of its lifetime (Skinner, 1981). Operant conditioning depends on the susceptibility of organisms to reinforcement, and generates a variety of behaviors that are not, or only to a small extent, related to reflexes (Skinner, 1981). Respondent conditioning depends on innate, phylogenetically selected susceptibility to stimuli.

As Pierce and Cheney (2017) pointed out, all behavior is biological. Both forms of behavior are possible within the organism, and they interact with each other in a number of ways. An organism is endowed with neurological capacity that enables learning through experiences and consequences (Cabirol et al., 2018; Pierce & Cheney, 2017). This capacity in turn has its origins in the evolutionary history of the entire species. Individuals that were able to change their behavior and adapt to varying environmental influences and as a consequence found new niches, gained access to such events as new food and protection from predators. Selection prepares for the environment of the past rather than the future, giving individuals with the ability to adapt an evolutionary advantage (Pierce & Cheney, 2017).

Several studies have examined individual physiological changes that come about from interaction with the environment. One such study analyzed the relation between individual brain size and the size of the social group (Dunbar & Shultz, 2007). This is the basis of the social brain hypothesis (SBH). This hypothesis states that organisms living within social groups have specific obstacles that require more cognitive load than solitary individuals. This means more time and effort in coordinating behavior with other individuals within the social group. Thus, behavioral flexibility would allow for the organism to navigate a complex social system (Dunbar & Shultz, 2007). Such behavioral flexibility and brain size of primates have been linked with the steady increase in size of the social group the primate exists within (Dunbar & Shultz, 2007).

Verbal Behavior and Rule Governance

Respondent and operant conditioning alone are not sufficient to explain the complex behavior that is emitted by animals such as humans. The evolution of the vocal musculature that made possible a varied combination of sounds that became associated with different events made it necessary to examine a third level of selection. The third level of selection deals with the contingencies created by a highly evolved social environment (Skinner, 1981,

p. 213). Human are said to have a unique trait that separates us from other animals; our capacity for verbal behavior (Skinner, 1957).

Verbal behavior can be defined as operant behavior that is established and maintained by its effect on other people's behaviors (Skinner, 1957). This form of operant control has extended the scope of influence of the social environment, extending the controlling contingencies that a social group can impose on individual behavior. In line with this, language is said to have evolved from this operant contingency as a form of social behavior (Passos, 2012). However, it is important to make a distinction between language and verbal behavior. Language simply refers to the specific characteristics of a verbal community, it is based on topography rather the functional properties (Skinner, 1987).

'The verbal community is made up of organisms plus a set of conventional practices, which are shared by the community and transmitted through generations' (Skinner, 1957 p.226). This community consists of a group of listeners and speakers, the listeners' behavior constitutes the reinforcement contingencies for the verbal behavior of the speaker. The listeners are themselves conditioned to respond accurately to the behavior of the speaker (Skinner, 1957 p.225). Although not direct analogies, verbal behavior, similarly to genetic endowment and passing down of trait specific characteristics, allows for the transmission of cultural practices that further the survival and success of the practicing members (Moore, 2018; Skinner, 1981). Although verbal behavior is not a unidirectional transmission process the way genes are, it can be argued that individual genetics are not the only means of trait transmission (for an extended discussion, see Jablonka & Lamb, 2006).

The verbal community in which an individual exists will 'arrange contingencies that bring behavior under the control of antecedent verbal stimuli' (Catania et al., 1989 p. 119). Verbal behavior is a defining feature in human culture. These contingencies that are formed by the culture or verbal community have the main function of promoting the survival of the

group, the relations between members, and the development of practices that foster new behavioral patterns in a social group that are required by an ever changing environment (Glenn, 1989).

The behavior that is emitted under these contingencies is referred to as verbal behavior or rule governed behavior, and the verbal antecedents used by the verbal community are contingency-specifying stimuli (Törneke et al., 2008). Behaviors occasioned by verbal stimuli can be insensitive to the natural consequences that the environment provides. Specific verbal stimuli such as rules or instructions have been shown to be able to override direct contingencies of specific environmental contexts or situations (Törneke et al., 2008). The study carried out by Hayes et al. (1986) showed how specific behaviors under the controlling function of instruction affected how individuals made contact with the natural contingencies programmed in the experiment.

In the Hayes's et al. (1986) study, participants were tasked with moving a light through a matrix by pressing a button, earning points that could be exchanged for money. Two experiments were completed, the first divided the participants into different groups and each group received a different instruction pertaining to the rate of button pressing. The second experiment tested the effects of instructional control and the effects of partially withdrawing it. The results of both experiments revealed that the instruction affected the rate of responding for the participants. In the second experiment the experimenters introduced instruction and later removed it, this was accomplished by pairing the verbal instruction with specific signals. These signals constituted specific lights that could then be withdrawn to test for the effects of removing instruction (Hayes et al., 1986 p. 245). However, the second study revealed that removal of the instruction did not lead to participants responding in correspondence with the programmed consequences (Hayes et al., 1986 p. 249). This can be

interpreted as the participants following their own self rules to continue responding and thus not contacting the programmed consequences.

Rules or instructions that describe sizable outcomes that are probable are often used to induce behavioral change in settings where the natural contingencies are ineffective (Malott, 1993), such as in organizational settings where the individual's performance is crucial for the consequences on a macro - level. In organizational settings, individuals frequently emit off-task behavior that negatively affects the organization and the individual (Malott, 1993). The field of performance management aims to 'bring out the best in people while generating the highest value for the organization' (Daniels, 2014 p. 1). The techniques used in performance management (PM) are derived from the applied branch of behavior analysis, the branch that deals with the development of technologies utilized in real world settings. One technique used in this field involves supplementing ineffective natural contingencies with verbal stimuli such as rules or instructions (Malott, 1993).

In an organizational setting, rules can be stated either by a manager, or by the individuals themselves as self-rules. The success of feedback, a frequently used intervention within organizational setting is presumably explained by verbal behavior (Peterson, 1982 p. 102). Feedback has been shown in a number of studies to result in positive behavioral change. Without additional stimuli, feedback can also result in the creation of self-rules (Coddington et al., 2005; Daniels, 2014; Peterson, 1982). However, self-rules that are developed by the individual do not necessarily result in desired or positive behavior that is effective in an organizational setting.

A rule can alter the value of a consequence, even if its occurrence is delayed and in competition with other stimuli within the same context (Hayes, Steven C., 1989 p. 275; Hayes et al., 1986). Delayed consequences function as a result of other stimuli that have been related to and/or signal the occurrence of that specific future consequence (Hayes, 1989 p. 277;

Malott, 1993). Individuals may create a set of rules where they avoid situations that need active pursuit of information or responses that are not yet in the individuals' repertoires, as a way of avoiding possible reprimands from a manager for not already having that required knowledge (Edmondson, 1999). In this contingency, all behaviors that might result in learning within an office will be positively punished, and those behaviors that avoid such situations are being negatively reinforced.

Such rules might have long term effects on the behavior of an individual, functioning as motivating operations (Blakely & Schlinger, 1987; Törneke et al., 2008) by altering the value of learning as a consequence; this abolishes or reduce the reinforcing effects of acquiring new knowledge or being productive in the office. This will affect further contact with reinforcers related to learning and productivity. Rules might also function as cues or discriminative stimuli under specific conditions, when a verbal stimulus such as 'watch this' occasions a response where the individual redirects their gaze. However, it should be mentioned that for a verbal stimulus to be considered a discriminative stimulus, the absence of that same verbal stimulus must function as an S delta. The absence of the verbal stimuli signal for non-reinforcement or extinction, and reduces the future probability of the same response in the absence of that verbal stimuli (Catania, 2013; Malott, 1993; Mawhinney & Ford, 1977). The control that specific discriminative stimuli has on an organism can also be explained by the effect that such environmental variables have on the individual's neural networks.

Neuroscientific research has demonstrated how cues that signal the imminent delivery of specific reinforcers result in the release of dopamine. Dopamine is highly known to facilitate and influence physical responses as a result of environmental stimuli (Bear & Paradiso, 2020). The release of dopamine that happens as a result of specific cues is said to stem from a different dopaminergic pathway from those that happen as a result of direct sensory stimulation (Donahoe, 2017). The ventral tegmental area (VTA) is a small subsection of

neurons found in the midbrain that is related to the dopamine system. The dopaminergic projection from this region, called the mesocorticolimbic dopamine system, has been implicated in the involvement of the reward system (Bear & Paradiso, 2020).

These neurons are widely implicated in the natural reward circuit of the brain for ‘adaptive behaviors’ as well as conditioned place preference (Donahoe, 2017; McBride et al., 1999; Bear & Paradiso, 2020). Conditioned place preference refers to the motivational effects of stimuli in an environment that has earlier been associated with a reinforcer (Nader, 2016). Dopamine is released by the cells of the VTA to the different areas in the brain, the release of this neuromodulator allows for the strengthening of synaptic pathways that are involved in the environmental and behavioral relation (Donahoe, 2017; Bear & Paradiso, 2020).

Depending on the type of reinforcer, basal such as food or social such as praise, different neuronal pathways will be strengthened and utilized. Unconditional reinforcers lead to the stimulation of specific neurons that are responsible for releasing dopamine that originates from the sensory receptors. Conditioned reinforcers, on the other hand, lead to the stimulation of neurons that originate from the prefrontal cortex (Donahoe, 2017). The latter describes the activation of reward pathways that directly avoid the synapses of the sensory receptors and pathways (Wise, 2002). This rerouting of dopamine that avoids sensory receptors has been used to explain events such as how organisms can be motivated to perform responses that might lead to aversive events such as shock (Olds, 1958) or starvation (Routtenberg & Lindy, 1965) to perform behavior occasioned by the current environmental cues.

Environmental cues can have a multitude of effects on the activity of neurotransmitters in the brain. This has been shown in terms of environmental stressors that affect almost every neurotransmitter in the brain (Peterson et al., 1993 p. 61). Dopamine, norepinephrine and gamma-aminobutyric acid (GABA) are but a few neurotransmitters/neuromodulators that are

affected by specific environmental cues that result in their modulation in the environmental – behavior relation (Donahoe, 2017; Peterson et al., 1993). The variety of rules that individuals come to create is a result of their interaction with other members of the verbal community (Zettle, 1990 p. 44; Skinner, 1965 p. 240). And these rules have the ability to affect the behavior of the individual, this has also been shown within neuroscientific research that depicts how verbal stimuli act as a cue that is able to produce biological consequences to the individual (Petersen et al., 1990; Raichle, 1997). This has been seen as relevant to learned helplessness, a state of inactivity or passivity in the face of prolonged and unavoidable aversive stimulation (Maier & Seligman, 2016). Where the contingencies that the individual is exposed to and how they are perceived affect subsequent behavior both overt and covertly (Peterson, 1993 p. 8).

Verbal behavior provides a functional method for controlling the behavior of different members of the same verbal community and culture (Glenn, 1989). In most cases, when analyzing complex human behavior, verbal behavior constitutes the basis of our observation. Including this, some cases require the use of verbal stimuli for the purposeful manipulation of other's behavior. Verbal stimuli are contingency specifying and function-altering, a manager or teacher has the ability to alter how specific contexts are perceived as well as how an individual organizes their behavior for future situations. The behavior analytic view of mindset theory is that it is a special case of verbally governed behavior, and that much of verbal behavior is self-rules. As noted by Skinner (1965 p. 36) 'by confining ourselves to these observable events, we gain a considerable advantage, not only in theory, but in practice.'

Verbal stimuli may create aversive consequences for an individual (Törneke et al., 2008). An individual may be both speaker and listener in a verbal episode, and create their own rules that in some cases may be inappropriate. Inappropriate self-rules or instruction can

affect an individual negatively in a given environment (Törneke et al., 2008). The possible insensitivity of rule governed behavior to natural contingencies of the environment may prevent the individual from getting into contact with natural events that may reinforce behavior. Such behaviors can also be established and maintained by the culture an individual exists within and the practices governing that culture (Glenn, 1989).

Culture and Cultural Practices

A definition of culture needs to include the historical context that all members of that group have been exposed to for the purpose of creating the shared values and behavioral characteristics. This learning history includes the different practices that the group has learned to solve a number of problems and that have been seen as advantageous in a given environment (Moore, 2018; Schein, 1990). On the basis of this culture can be defines as,

“(a) A pattern of basic assumptions, (b) invested, discovered, or developed by a given group, (c) as it learn to cope with its problems of external adaptation and internal integration, (d) that has worked enough to be considered valid and, therefore (e) is to be taught to new members as the (f) correct way to perceive, think, and feel in relation to those problems” (Schein, 1990 s. 111).

The main focus here is the establishing and maintenance of a variety of behaviors that also is passed on to other members within the same group. From a selectionist perspective, specific practices that aid the further survival of the group are selected (Moore, 2018). The local reinforcement contingencies maintained by members of the group to other members for conformity to the rule will maintain the selected practices. Including this, the established practices will be transmitted to other members of the group (Moore, 2018). The social environment in which we interact is effective in changing an individual’s behavior, adapting it to what the culture deems as acceptable (Skinner, 1981).

The Theory of Mindset

The capacity that humans have for behavior change can be observed at all three levels of selection. This led Carol Dweck to postulate that humans have an inherent capacity for learning and establishing the research field of *mindset*. The term was first popularized within her book *Mindset: The New Psychology of Success* (2006). Her research into this field was inspired by the observation of discrepancies between the performances of individuals that was not a result of differences in skill or intelligence (Blackwell et al., 2007; Henderson & Dweck, 1990; Hong et al., 1995; Yeager & Dweck, 2012).

Dweck's main points are how an individual's cognitive variables are able to affect subsequent behavior (Elliott & Dweck, 1988). She has published a number of articles that have primarily been focused on motivation within the education sector (Yeager & Dweck, 2012). In many of her articles she has examined the concept of fixed and growth mindset, using the performance of students in school, on relations between conflicting nations, and on willpower, among other topics, as experimental sense (Dweck, C. S., 2012; Yeager & Dweck, 2012).

Implicit theory (or mindset) is based on the assumption that an individual's belief about the nature and form of human attributes will affect the observed behavior of that individual and the ideas they have of others (Dweck, C. et al., 1995). Various categorizations of implicit theories (mindset) exist, frequently with a distinction between fixed and growth mindset. The different categories of mindset imply different behavioral patterns for the individual (Dweck, C. S., 2012).

Mindset theory stems from two other know theories that deal with perception and personality. These theories are Kelly's theory of personality and Heider's theory of social perception (Dweck et al., 1995). Individuals within their day-to-day activities tend to choose specific goals, which in turn affect how information is viewed and processed. The specific class of goals relevant to this are known as achievement goals. According to Dweck, adaptive

and maladaptive behaviors can be explained and categorized by the degree to which an individual works towards fulfilling achievement goals, and there is a distinction to be made based on the type of achievement goal utilized (Elliott & Dweck, 1988).

Achievement goals can be divided into performance goals and learning goals. The former deal with the perceived judgement others make of a subject's ability or skill, while the latter deal with the subject's desire to increase his or her own competence and ability (Elliott & Dweck, 1988). Why some individuals choose the (presumably) maladaptive performance goals, while others choose the more adaptive learning goals, requires explanation. Dweck (1986) suggests that the mindset or implicit theory an individual carries determines the choice of the subsequent type of goal.

Unlike other theories of motivation, mindset theory focuses on how specific learning strategies that are utilized in a number of fields and sectors may intentionally or unintentionally create behavioral patterns that restrict learning. Theories of motivation are popularized within a number of areas that incorporate energy output from an organism (Chambers, 2007). These theories serve as tools for understanding, and possibly achieve a certain level of control over an individual's behavior. The purpose may be increasing efficiency in for example employees within an organization (Badubi, 2017), students in school (Blackwell et al., 2007) or individuals in a society in general (Benartzi et al., 2017; Dweck, 2012). These are but a few contexts where different motivational theories direct the investigation of an individual's energy output within certain contexts, and of how this can be affected.

Intrinsic and Extrinsic Motivation

Motivational theories can provide useful tools for the effective and purposeful manipulation of an organism's behavior, and all motivational theories are not equal. One important dimension along which motivation theories differ is along the dimension of internal

– external, or intrinsic – extrinsic motivation (Ryan & Deci, 2000a). Assumptions about what variables controlling the responses of an individual varies, and their effectiveness vary widely, depending on theory and experimental method. The self-determination theory introduced by Deci et al. (2001; Ryan & Deci, 2000a) focuses on variables existing within the organism as causes of responding.

Deci and Ryan's self-determination theory assumes that humans are born with a natural curiosity to learn and explore. Their definition of motivation assumes that individuals are moved to do a task or event (Ryan & Deci, 2000a). Motivation according to Ryan and Deci (2000a), is a multi-faceted phenomenon that varies along a continuum. This continuum ranges from the more extrinsic forms of motivation to the more intrinsic forms of motivation. The self-determination theory focuses on the types of motivation that affect the psychological needs of the individual: relatedness, autonomy, and competence. The differentiation between types of motivation is based on the specific reason or aim of the given response (Ryan & Deci, 2000b).

Ryan and Deci call it intrinsic motivation when an individual completes or pursues a task based on its inherent satisfaction, and the task is perceived as inherently interesting and enjoyable, without any further external or separate consequences. Self-determination theory which bases itself on intrinsic motivation is further divided into two main sub theories, cognitive evaluation theory (CET) and organismic integration theory (OIT). 'CET is primarily focused on the social and environmental factors that facilitate versus undermine intrinsic motivation' (Ryan & Deci, 2000a, p. 70). OIT is focused on the different forms of extrinsic motivation and the variables that hinder or facilitate for the integration and internalization of these types of events (Ryan & Deci, 2000b).

Extrinsic motivation is assumed to be different from intrinsic motivation, here individuals do certain tasks for consequences other than enjoyment of the task itself. The

different degrees of external motivation are dependent on the level of integration and internalization of the values that are regulating behavior (Ryan & Deci, 2000a).

Internalization describes the taking in of the specific value, while integration is a process by which those values are made as their own. This type of motivation ranges from what is called amotivation, being lacking the intention to act, to intrinsic motivation (Ryan & Deci, 2000a). Within this framework, the types of extrinsic motivation closest to amotivation are the ones characterized by a lack of autonomy. Along the continuum, the further away the purpose of doing a task is from the amotivation, the closer the individual is to the more intrinsically motivated responses (Ryan & Deci, 2000a).

Self-determination theory utilized empirical methods to analyze how specific environmental arrangements can either increase this innate ability, or thwart it (Ryan & Deci, 2000b). Deci and Ryan distance themselves from what they see as a mechanical view of human motivation that is often associated with the empirical methods they use (Ryan & Deci, 2000b). The framework they propose focuses on different types of motivation and how some may lead to specific behaviors that are negative. Self-determination theory predicts that individuals intrinsically motivated by a task will be more successful in fulfilling the task than those motivated by external reward. Deci and Ryan accept the fact that an individual, by social support, can learn to internalize and integrate specific ideas and values and turn them into motivational variables (Ryan & Deci, 2000b).

The theory of self – determination differs to a degree from mindset theory, even if both discuss how the individual's social environment can affect its behavior. There is less focus on the distinction between extrinsic versus intrinsic motivation within mindset theory. In mindset theory the focus lies on how specific environments such as the specific strategies used by a teacher, manager or parent, can create behavioral patterns that may either foster

continuous learning and curiosity within a given task, or hinder it (Dweck, 2012; Elliott & Dweck, 1988; Yeager & Dweck, 2012).

Mindset theory is a modern theory that aims to explain how different behavioral patterns are affected by specific environmental variables. A growing body of neuroscientific research is being extended towards the study of motivation, specifically in terms of mindset theory (Moser et al., 2011; Ng, 2018). Using technologies such as electroencephalography (EEG) and the functional magnetic resonance imaging (fMRI), researchers can further examine the biological correlates of mindset theory. However, it should be mentioned that these technologies are still assumed to be novel and thus lack the precision needed to state causal relation (Ng, 2018).

Within the history of psychology, the differences separating schools of thought have been considered important aspects (Overskeid, 2007 p. 594). This differing of paradigms results in different forms of answers pertaining to the investigation of human behavior. The contextualistic paradigm, on the other hand, investigates an event or experience with the accompanying context (Biglan, 1995a). Including this it has a tendency to investigate individual cases rather than group models that might help contribute to the theory of mindset. Studies that have tried looking at the effects of mindset theory has yielded different results, with some studies indicating that growth mindset is negatively correlated with academic achievement (Sisk et al., 2018).

These types of findings might have of a number of reasons, one of them being the use of group models to analyze a single intervention. The contextualistic paradigm that focuses on individual cases might be a better fit in such a case in terms of isolating actual variables. Thus, the behavior analytic perspective that abides by the contextualism paradigm and its use of single subject design might help develop the theory of mindset.

Integrating Perspectives and Unifying Science

Accepting the utility of complementary perspectives highlights the necessity for the integration of the different fields. Mindset studies are traditional psychological research and can be improved by investigating biological/neurological correlates and picking up from behavior analysis the body of knowledge about environmental effects on organisms. A reductionistic approach where each component of a phenomenon, in this case, the different behavioral patterns can be separated from each other and carefully analyzed (Wilson, 1998). Already a variety of neuroscientific evidence has been used to support the effects of fostering growth mindset within individuals (Mangels et al., 2006; Moser et al., 2011; Ng, 2018).

Studies incorporating event-related potential (ERP) have been used to show the differences in error detection between individuals that have differing mindset (Mangels et al., 2006). ERPs are electrical signals or responses fired by the brain as a result of different stimuli. These responses are assumed to be a brain response when a specific error has been detected (Yin et al., 2016; Friedman & Johnson, 2000). The technique that uses ERP base itself on ‘the temporal resolution in millisecond range that permits the precise quantification of the temporal characteristic of neural activity’ (Friedman & Johnson, 2000). Such responses are said to be generated by both external (exogenous) and/or internal (endogenous) stimuli (Luck, 2012). Studies have shown that individuals that have a fixed mindset react neurologically different to negative feedback compared to those that have a growth mindset (Mangels et al., 2006).

The study done by Mangels et al. (2006) showed that the participants with a fixed mindset showed a higher error-detection response towards negative feedback, while those that held a growth mindset showed a reduced response meaning that they found negative feedback to be less threatening or salient (Mangels et al., 2006 p. 81). These results also showed that there were behavioral correlates that happened after the ERP response. Participants with a growth mindset engaged in reactive behaviors that focused on encoding or learning of the

correct responding for later trials, while the participants with a fixed mindset engaged in behaviors that could be categorized as rumination or self-criticism rather than focusing on learning new skill (Mangels et al., 2006).

Mindset in the Applied Setting

After receiving performance feedback that indicates that one has made an error (a common device in mindset research), it is crucial for that individual to persist in behavior that leads to achievement and accomplishing their own goals. This is a necessary characteristic that gives an individual a competitive edge. The current labor market prizes employees who can maintain peak performance even in situations that can be described as aversive (Hallett & Hoffman, 2014; Harvey et al., 2019). There is evidence that specific organizations or workforces are moving towards a more globalized social structure that places high demand on both leaders and employees (Sandaker, 2009). Individuals in today's market are expected to be able to establish and maintain a level of performance that can fit a dynamic environment. Such types of environments offer a variety of challenges that a leader or an employee is expected to tackle (Sullivan & Page, 2020 p.180). These challenges or contingencies require specific behavioral patterns, whether they be response chains that are ready for sudden changes in the environment, or response chains that are able to remain stable in specific contexts.

Peak performance requires a specific learning history where individuals have been consistently shaped to emit specific behavior patterns in varying contexts. Workspaces that utilize strategies that focus on proper training of employees will therefore be able to establish and maintain peak performance within their employees (Hays, 2009). Lacking the skill and knowledge that is needed to achieve peak performance may result in individuals actively avoiding such interactions, hindering learning (Nemati et al., 2013). Achieving a level of performance where an individual persistently pursues a dominant superordinate goal despite

setback is the definition of grit (Duckworth & Gross, 2014 p. 1). Grit alongside growth mindset are constructs that are related to persistence.

A gritty individual is said to view ‘success and achievement of goals as a process or marathon, and view stamina as their competitive advantage that one constantly works on improving (McClendon et al., 2017 p. 9). The important factor in how grit can be developed is through the embracing of a growth mindset (Hochanadel & Finamore, 2015 p. 49). The concept of grit by Duckworth et al. (2007) and mindset by Dweck (2006) have both been connected with the theory of deliberate practice by Ericsson et al. (1993). Deliberate practice involves mindful practice and development of skill and performance with the help of skillful instructors. These concepts and theories point to the development of persistence as a skill or talent that can be intentionally induced with the proper set of contingencies; as distinct from a trait that one is born with.

The literature about growth mindset claims that growth mindset can be utilized as a tool to guide people in managerial positions on how to properly coach and influence their employees or coworkers (Sullivan & Page, 2020), by providing a perspective where a high level of performance and grit can be attained by using specific strategies. How these mindsets are established and how they ultimately orient individuals towards specific patterns of learning and behaving still remains to be investigated in depth. The behavior analytic perspective can thus aid with this by introducing a selectionistic perspective, as well as a methodology for the testing and analysis of variables.

The current paper therefore aims to analyze the different theoretical frameworks that aim to explain the evolutionary capacity humans possess for learning. This capacity is inevitably affected by the specific contingencies of reinforcement that individuals are exposed to. Some will argue that growth mindset is a trait that can be gradually shaped by the specific culture an individual exists within. This can in turn be explained as a result of

environmentally induced change in brain structure and function, as explained by Jablonka and Lamb (2006), where transmission of information between individuals and generations need not only happen through biological processes. Through communication and interaction with environmental variables, specific traits can be heritable and changes in biology within individuals ensue (Jablonka & Lamb, 2006; Krispin, 2017; Moore, J., 2003; Sandaker, 2009; Skinner, 1981).

To analyze how the different frameworks interact and lead to the complex behavior that can be observed within different cultures data expected to measure aspects of mindset culture was collected, in the form of a questionnaire that was sent to different branches of the popular sporting goods retail chain *Anton sport*. The questionnaire was created by a consultancy firm that specializes in measuring the culture existing in an organization and then developing interventions based on theories such as growth mindset, for the purpose of motivating employees to develop useful routines or behaviors that further the success of the organization. This questionnaire was answered by the employees and contained different statements that could be ranked on a Likert scale.

The purpose of this was to investigate whether the branches that utilize more growth mindset strategies towards their employees show superior results on a key performance indicator (KPI). A KPI is understood as a point of measure when determining how successful an organization is. KPIs describe the key criteria that indicate whether the organization is heading in the right direction (Badawy et al., 2016). In this context the KPI was the organic growth in the last three years (2018, 2019 and 2020) attained by the different branches of *Anton sport*.

Method

Participants

The participants of this study were 162 employees from 13 retail stores in the sporting goods chain Anton Sport. Anton sport has a total of 18 retail stores within the areas of Oslo and Viken. Specific inclusion criteria were made for the choosing of which stores that were to be included in the study. These criteria included having a relatively stable organizational culture for the last three years, showing steady organic growth over a minimum of 3 years, no changes in management, no change in local competing businesses, and no recent internal company restructuring.

Apparatus

A Growth Mindset Index questionnaire (GMI) developed by a consultancy firm was distributed to the individual employees of Anton Sport. The questionnaire was designed to measure specific behaviors assumed by the consultancy firm to be connected to growth mindset culture. Five factors are assumed to be important for identifying the type of mindset culture that exists within an organization. For each factor, employees rated five claims on a Likert scale ranging from one, completely disagree, to seven, completely agree. Statistical analysis of the results were done by computer, using SPSS software.

Procedure

Data collection was conducted by the consultancy firm, a performance improvement consultancy. The firm identified the specific branches in Anton Sport that satisfied the inclusion criteria, and the growth mindset index was sent to the various branches to be distributed to their employees. When the GMI was completed, the results were collected by the same consultancy firm for further analysis. The authors of this study did not partake in any of this part (see Appendix). GMI is a psychometric test that has its primary focus in analyzing specific events within a sample. The questionnaire was divided into five major factors: psychological safety, communication and cooperation, motivation, curiosity and idea cultivating, and learning contingencies. It is important to note that there is no unanimous

agreement on the exact factors that make up the construct mindset. The abovementioned factors are just a few that the firm has concluded to relate to KPI in an organization.

Psychological Safety. Research focusing on the interaction between individuals in work teams has shown that the employee's belief about the nature of interpersonal interaction influences learning behavior. Psychological safety relates to the belief an employee has on interpersonal risk taking. Individuals collaborating in a team may need to relay information that might place themselves in a disadvantageous position, either by admitting a fault or emit behaviors that may lead others to view them as incompetent (Edmondson, 1999). Such behaviors in many cases inhibit learning and may thwart the development of the organization by reducing cognitive and behavioral flexibility within the employees (Dutton, 1992; MacDuffie, 1997). Individuals existing in work teams and that believe that taking such risk will introduce an opportunity for learning rather than criticism has shown to lead to interpersonal trust and respect between the members. This creates an environment that facilitates and foster for further learning and inquiry of knowledge (Edmondson, 1999). The exact type of environment that is described by Dweck to facilitate for a growth mindset culture.

Communication and Cooperation. Proper communication is essential in a well-functioning organization. Employees need to be able to discuss and speak out about important tasks or situations related to work or the workspace (Roberts & Charles A. O'Reilly, 1974). Lack of proper communication is a trait that is often associated with a fixed mindset (Murphy & Thomas, 2008 p. 273). Individuals that are unable to state their opinion or listen to others' ideas or arguments are said to have a fixed mindset.

Motivation. Having a growth mindset is reliant on being able to utilize strategies that are meant to encourage learning-oriented goals that will motivate employees or students.

Thus, being able to encourage, reinforce and give adequate feedback are considered important traits that a leader can have.

Curiosity and Idea Cultivating. Questioning one's surroundings is considered an important part in the learning process (Mussel, 2013). By actively questioning of the environment or workplace, an employee can find core flaws of a specific situation, which can lead to the individual seeking out specific strategies for improving or fixing what is deficient (Harrison & Dossinger, 2017). This will then lead to the individual seeking out specific strategies to improve or fix those problems. For the establishment and maintenance of problem-solving behaviors, the culture of a specific organization needs to be encouraging (Austin et al., 2012; Litman & Spielberger, 2003). Individuals in managerial positions need to inspire their employees to speak up when errors are noticed or when innovative ideas are thought of.

Learning Contingencies. This factor can be assumed to focus on events that are supposed to facilitate for the employee's effort to increase their own competence. This stems from the type of achievement goal that Elliott and Dweck (1988) mentioned in their paper. This section of the questionnaire can be assumed to take into account events that are directly related to the internal processes that are put forth for the purpose of maintaining the established structure and function of the organization (Sandaker, 2009 p. 9). Such events may include specific routines that the employees need to equate to in the different contexts of the organizations. The main objective here will therefore be establishing adaptive behavioral patterns that are gritty and are less threatened by performance feedback (Bell et al., 2006).

A Cronbach's alpha analysis was done to measure the internal reliability for each factor in the questionnaire. This allowed us to observe whether responses within individual factors were answered consistently by the participants. Such measures are typically used to increase the level of reliability on test that are not taken in two different times such as the test-

retest method. Scores or results that have a value of 0.7 and higher are considered to indicate high internal consistency. For questionnaires with fewer than 10 items, the value of 0.5 or higher are generally accepted. This form of reliability measure will secure against certain threats that are the result of an individual learning the different items of the test due to taking it again at another time (Neuman, 2013). Internal consistency reliability is used to test the same item or factor multiple times within the same test to observe if there is consistency in the answers (Neuman, 2013).

Including this, a Pearson's - and Spearman's rho correlation analysis was integrated to analyze the relationship between the score on GMI and KPI. The correlation coefficient is a measure of correlation between variables. The correlation coefficient gives an indication of the strength rather than direction of relationship between the variables in question (Field, 2013). There exist two types of correlations, partial and bivariate. The former deal with analyzing the relationship between different variables while controlling for the effects of other additional variables. Bivariate correlation on the other hand analyzes the relationship between two variables (Field, 2013).

A regression analysis was also carried out to measure the relationship between the individual factors and KPI, and between GMI and KPI. These analyses were done for each retail store. A regression analysis measures the association between two or more variables. This will give us an estimate of both the direction and strength between the variables of interest (Lee et al., 2014). This will help to further explain whether the dependent variable, KPI, can be predicted from the independent variables, the overall score in GMI or the individual factors. Within here the R^2 will also be analyzed to identify the explained variation with respect to the predictive strength of the regression models.

Finally, an overall analysis of the relation between the score of GMI between the various stores will be compared to each other. This will give an indication of where the

different stores lie in comparison with each other. These results were already established by the consultancy firm, the firm utilized their own method of analyzing the scores from the different participants. To calculate the percentage of a retain store scores in a single claim within a single factor, the neutral score being five on the Likert scale is first removed. Then the percentage of those that disagree with the claim or item is then subtracted from the percentage of those that agree. Then the results will be divided by five to get the mean score for the factor. To figure out how the company scored on the factor the same method is used on all claims and then summing then up before dividing it by five, to get the percentage every claim will be multiplied by 100. The same procedure goes for how to calculate the total GMI score. In addition to the analysis from the consultancy firm.

Results

The central results that came from the consultancy's analysis are presented on *Table 1*. The data from the respondents show a considerable level of variability between scores in terms of percentage of growth mindset culture. The results from the GMI survey showed that the retail stores A, B and C scored the highest with scores depicting 76%, 59% and 50% growth mindset culture, respectively. The stores that scored the lowest, J, K and L scored 10%, 4% and 0% growth mindset culture, respectively.

Internal Consistency Reliability Analysis. The alpha coefficients from the different factors yielded little variability in the obtained values, as represented in Table 2. The GMI consisted of a total of 25 items that were divided into five subscales or factors. The lowest α value came from the subscale "Motivation" with a value of 0,680. Analysis of the item total statistics on SPSS showed that one of the items was negatively correlated with the others. This was found to be item O, and the removal of this item resulted in an increase in alpha score to 0.840. The highest α value came from the subscale "Communication" and "Curiosity" both with a value of 0,894. The remaining α values depict 0.869 for 'Learning condition' and

0.864 for 'Psychological safety'. The α values relay that responding within each factor remained consistent for the different participants. Based on the results from the α test the GMI survey was found to be highly reliable.

Pearson Correlation Analysis. The main results from the analysis are summarized in Table 1. The results comparing the correlation between GMI and KPI revealed that there was no significant correlation between the variables $r(13) = .158, p > .05$. A Spearman's rho correlation was also done to determine whether there was a difference between the two measure of correlation coefficient. However, both the tests yielded similar results, $r(13) = .195, p > .05$. The correlation here is not statistically significant.

Regression Analysis. The linear regression was utilized to measure whether the different factors in GMI significantly was able to predict achieved KPI. Neither analysis from the individual factors showed any significant results between the variables. The results from the regression analysis relayed that there was a non-significant relation between the dependent variable (KPI) and the independent variables (factors). The results for the dependent variable KPI and the independent variable 'Psychological safety' yielded a non-significant regression equation ($F(1,11) = 0.214, p > .05$), with an R^2 of .019. This suggests that psychological safety explained 1.9% of the variance in KPI, nevertheless this was not considered significant. Thus, the null hypothesis cannot be rejected.

The results of the regression analysis that tested the relationship between the factor 'Communication' and KPI also showed no significant relationship between the variables ($F(1,11) = 0.103, p > .05$), with an R^2 of .009. Thus, 'Communication' explained only .9% of variance in KPI. Results measuring the relationship between 'Motivation' and KPI also showed no significance ($F(1,11) = 0.373, p > .05$). The R^2 showed a value of .033 meaning that 'Motivation' explained 3% of variance in KPI. Results analyzing the relationship between

'Curiosity' and KPI showed no significant association between the variables ($F(1,11) = 0,184, p > .05$) with a R^2 of .016, meaning that 'Curiosity' explains only 1,6% of the variance in KPI. Results from the last factor was neither significant nor did it show any correlation between 'Learning condition' and the KPI ($F(1,11) = 1,610, p > .05$) with an R^2 of .128 meaning that 'Learning condition' explained 12,8% of the variance in KPI.

Discussion

The main purpose of this study was to investigate whether high scores on growth mindset culture as measured by a questionnaire correlates with a high rate of organic sales growth. This was done by collecting and analyzing the verbal reports of employees from 13 different stores of the same sporting goods brand. Several inclusion criteria were set to identify the stores that were to be included in the study. Different statistical analysis was utilized to investigate the data from the questionnaire.

Cronbach Alpha Measures and Reliability

The findings from the different statistical analysis depict varying results. Investigations of the reliability of the questionnaire showed that there was a high degree of consistency in responding within each factor. Reliability measures of the GMI instrument serve to help give an estimate of the validity of the concept and study as a whole. No study can be assumed as valid or accurate if its instruments are unreliable (Tavakol & Dennick, 2011). However, it should be mentioned that the high scores on the alpha test may be a result of a number of factors that might not necessarily prove in favor of the instrument.

The alpha score can be easily over- or underestimated, depending on the number and nature of items relayed as well as the heterogeneity/unidimensionality of the questionnaire (Tavakol & Dennick, 2011). The alpha level of the factor 'Motivation' was observed to be the lowest (0.648) compared to the other factors. This might be caused by a number of reasons,

such as the low number of questions, or the unidimensionality of the factor.

Unidimensionality refers to the degree to which the items are measuring the same construct (Tavakol & Dennick, 2011). Considering that on the item total statistics, the removal of one of the items (item O) resulted in a substantial increase of the alpha value, from 0.680 to 0.840, might entail that that specific item was measuring a different construct or contingency than the other items.

Despite the results from the analysis, alpha scores, whether high or low, may not signify that the questionnaire or measuring instrument is completely reliable (Taber, 2018; Tavakol & Dennick, 2011). Analysis have shown that even high values on the alpha scale may simply reflect that the items on the scale were measuring some event that is similar to the other items. This means that whether the instrument measures the same construct (unidimensional) or constructs that might be slightly similar (multidimensional), the alpha score may still be high (Taber, 2018). This suggest that reviewing the questionnaire alone may not be adequate to attain an understanding of the phenomenon in question and other measures need to be taken to ascertain what is actually being observed.

Regression Analysis and Validity of Mindset

A simple linear regression analysis was carried out for this purpose. The results of the regression analysis that measured the relationship between the factors of GMI and KPI however, showed either non-significant or no correlation. The purpose of such an analysis is to measure the signal strength of the factors of GMI as predictors for the KPI outcome (Zou et al., 2003). There was no significant association between the two variables. This could be caused by a number of reasons, one such being the fact that the variables that are assumed to be associate with KPI have not been properly identified. This is also evident in both the Pearson's correlation and Spearman's rho correlation coefficient. Both were used as a way to attain sensitivity measures that would give a more accurate depiction of the variables. Based

on the results there was neither a significant nor numerical association between the variable GMI and KPI for the different stores.

Based on the relevant parameters and inclusion criteria for choice of stores these results are in correspondence with earlier research in the topic. Mindset theory that was first popularized by Carol Dweck has evolved substantially throughout the years. Based on the literature it can be assumed that the theory has grown to encompass a wide range of situations and behaviors. This in of itself is an advantage for a theory that aims to be able to predict and control behavior. In spite of this, the theory has grown and evolved substantially but the focus on grasping the exact variables that would allow for the intentional manipulation still remain unclear.

This may in turn be explained by the lack of consistency in terms of how a mindset intervention are applied (Sisk et al., 2018). The common approach within mindset interventions is to use group designs. The group design draws out inferences or conclusions from studies of interventions that happen at the group level. After, a number of statistical tests are used to test whether the null hypothesis can be rejected or confirmed (Morgan, 2009). However, a known problem in terms of group intervention is that the value a researcher gets from aggregate data can be quite low. Aggregated data represent the estimates of a specific group or population, this gives as an economical way to categorize or further process observations. Despite this, such data may be unrepresentative of the single individuals existing within the same group (Morgan, 2009).

Building a solid framework for the interpretation and analysis of data is an important goal of science. Statistical analyses are often used to draw inferences about the phenomena under study. However, relying on these inferences alone has been shown to lead to certain problems, one such known as the underdetermination of data; the fact that the data obtained by mere observations of a phenomenon is not in of itself self-evident. Thus, we need to

develop a framework that specify how such data need to be interpreted (Laudan, 1996).

Through theory development and a solid conceptual framework, we develop the means of how to verbalize and interpret them. A number of studies have shown that the same data have been observed to fit within different statistical models. This further places and emphasis that results from statistical models alone are not enough to make final inferences on observed behavioral phenomena (Long, 2013). The same data may as well fit to a number of other models that might suggest different interpretations of the same phenomena.

This further accentuate the importance of reviewing the contingency as a whole that different individuals are exposed to. Contingencies refer to the relationship between a behavior and its outcomes, some describe this as an 'if...then' situation. The behavior is seen in the context of the events that happen before and after its occurrence (Cooper et al., 2007; Catania, 1998; Mechner, 2008). Behavioral contingencies can encompass the analysis of both the behavior of the individual as well as the behavior of a group of individuals (Mechner, 2009).

Investigation of the contingencies in both the individual and group level rely on the careful observations of the external variables that affect behavior. Analyzing specific contingencies bring back the focus of science within the behavior analytic perspective, which deals with finding how certain behaviors can be influenced to bring about the change that is needed or wanted under specific contexts (Mechner, 2008). Reaching this level of explanation and understanding of a behavioral phenomenon is not possible by basing oneself on just aggregate data. This is because a focus on aggregate data may result in not being able to completely grasp the mechanisms or variables that are affecting the individual.

A study that is unable to determine the variables that affect the observed phenomena in focus is assumed to have a validity problem (Shadish, 2002). Unlike reliability, validity is seen as harder to achieve. This is because validity refers to the correctness of certain

constructs and its measurements within a specific purpose. This makes validity part of a more complex and dynamic process where it gets strengthened by the number of accumulating evidence that spans over a longer period of time (Neuman, 2013). On the basis of this, a proper analysis of the validity of a study is an important aspect that all experimental studies must incorporate. This is important because it helps further guide and inspire the direction of future research (Onwuegbuzie, 2000). The statistical analysis of results of the current study found no significant relationship between the variable GMI and KP, suggesting that the relationship between the variables is affected by other extraneous and/or mediating variables that the study has not been able to contact. This is a frequent criticism by behavior analysts of studies within cognitive and mainstream psychology.

The Confusion of Variables in Mainstream Psychology

Mainstream psychology has been criticized for sometimes lacking an acceptable level of experimental control, suggested as one of the major reasons for what is known as the replication crisis (Wiggins & Chrisopherson, 2019; Shrout & Rodgers, 2018). This criticism encompasses a wide variety of issues that have plagued the field of psychology. Issues range from lack of proper publishing practices and publishing practices that focus on appealing to the media or specific journals, to lack of success when it comes to replicating major findings. Critiques have also brought up the wrongful manipulation of statistical data to achieve desired results as a part of this crisis (Wiggins & Chrisopherson, 2019; Shrout & Rodgers, 2018). This problem is not an inherent problem for psychology alone, in recent years it has received more attention.

Overgeneralization. Many have tried to analyze the possible explanations for the specific replication crisis within psychology. The explanations most utilized within the field of psychology base themselves on the overgeneralization of effects that might be assumed weak into more broader situations (Shrout & Rodgers, 2018). Results that may have occurred

due to coincidence within the experimental situation may then be attributed and generalized to other settings. This further results in the confusion of the types of studies that aim to explore the variables that cause a certain phenomenon (exploratory studies) for studies that try to confirm whether certain obtained variables are actually correlated with the phenomenon (confirmatory studies) (Ledgerwood et al., 2017; McBee & Field, 2017).

Category Error. Including this, another common explanation usually cited by behavior analysts involve category mistakes among other elements. More specifically, the concern that the conventional causes within mainstream psychology tend to not refer to an event that have occurred. The event that has been stated as the basis for observation later also being used to explain the event that has just been observed (Holth, 2001). Along with this, the dualistic world view that dominates mainstream psychology also confuses the types of variables that are of importance for the purpose of finding an adequate explanation of the phenomena in focus. Dualism or the mind-body (sometimes also referred to as souls - bodu) dualism has its origins from the philosopher René Descartes. Here he argued that the structure and function of the mind and body are inherently different, the mind being an entity that is affected by different events than the body. This dichotomy presents itself as a problem, the mind and body are in this case assumed to be existing within different world or categories (Thibaut, 2018).

As of current there are no scientist that believe in the concept of literal dualism, which is the believe that there does exist a hard divide between the body and what is assumed to be a soul (Hayes & Brownstein, 1986). However, remnants of this cartesian belief still exists in the field of psychology. The idea that private events are under governance from completely different variables than those that govern overt behavior is one such example. This notion creates a category error and is problematic in scientific inquiry. The problem that results from such a division is the assumption that the same events belonging within the same category is

then assumed to exist in a different category or realm and therefore cannot be affected by the same variables (Holth, 2001; Ryle, 1949). This will ultimately result in confusion in terms of analyzing the different variables and how they interact.

From this, the validity of the construct of mindset can be to some extent questioned. The variable of mindset is defined as a specific trait that an individual carries that in turn has an effect on the goals created and subsequent behavior (Elliott & Dweck, 1988). The specific mindset of an individual is not a variable that lets itself be manipulated. The way mindset is described, it is a summary label that economically describes the expected patterns of behaviors that an individual will exhibit. The behavior and the contingencies that govern it should thus be the main basis of observation. Such a view point has also been echoed by a number of other articles that have questioned whether the existing tests or methods used to measure mindset are actually able to grasp the full extent of what the term mindset is claimed to encompass (Corradi et al., 2019; Lüftenegger & Chen, 2017; Tempelaar et al., 2015).

Current instruments for measuring mindset are questionnaires that focus on either conforming to or rejecting common statements associated with a specific type of mindset (Dweck et al., 1995). The logic behind this, according to Dweck et al. (1995b p. 326), is that the individuals that disagree with questions that adhere to the fixed mindset tend to conform to the growth mindset within that specific topic. It is acknowledged by Dweck et al. (1995b p. 323) that there may exist other variables that determine the type of mindset of an individual, and that mindset exists within a larger interconnected network where changes in one variable affects the others (Dweck et al., 1995b).

The construct validity of the concept of mindset is thus problematic. Construct validity refers to whether the measures taken encompass the particular construct or phenomenon that is studied. Construct validity contains content, predictive and/or empirical validity (Strauss & Smith, 2009). Whether the concept of mindset is a unidimensional or multidimensional

construct has been discussed. Dweck et al. (1995b) claim that this is a unitary topic, but this view is not supported by other studies (Tempelaar et al., 2015).

Mindset may possess low construct validity, as described in Dweck's studies. This points to the need of understanding the concept with the focus on individuals rather than groups. Individuals react differently to interventions based on the varied learning histories that they may have. Thus, incorporating the behavior analytic methodology of single subject (N=1) design might help improve theories that aim to understand behavioral phenomena.

Single Subject Design

Single subject interventions focus on experimentation and on data obtained from a single participant (Cooper et al., 2007; Cozby, 2015). This is based on the operant methodology that was pioneered and inspired by B. F Skinner and his students (Bailey et al., 2002). A single subject design is considered strong if the intervention is reliably able to demonstrate control over behavior by manipulations of the independent variable (Arntzen, 2010; Cooper et al., 2007). Thus also allowing for the investigation of the counterfactual condition that emphasizes on what would happen if the independent variable had not been implemented on the same individual (Bailey et al., 2002).

The single subject design model lets the researcher test whether the manipulations of the independent variable produce observable changes in the behavior within the same person. Being able to carefully observe interventions and taking data on an individual basis is advantageous for a theory like mindset. Having a focus on control is an important aspect within science, it makes it possible to develop interventions that might help with prevention or further development of certain behaviors that are needed in specific contexts (Biglan, 1995a; Hayes & Brownstein, 1986).

Verbal Behavior and Metacontingencies

The focus on control as well as prediction forms the basis for sciences working within a contextualistic paradigm (Hayes & Brownstein, 1986), and shapes specific verbal behavior in researchers. That verbal behavior brings attention to specific environmental variables, rather than generalized descriptions of phenomena where functional relations between variables have not been identified (Hayes & Brownstein, 1986; Long, 2013).

When it comes to the cooperation between members of a culture, contingencies maintained within a cultural or group setting require specific patterns of behaving that differ significantly from the patterns that solitary or individual's exhibit for their own benefit (Dunbar & Shultz, 2007). Within the level of cultural selection, it is essential for members of an existing culture to differentially reinforce the behavior of practicing members. This is an important determining factor, that aids in the survival of the group as a whole (Glenn, 1989; Moore, 2018).

Verbal behavior plays a major role in the development of cultural practices (Glenn, 2010; Glenn, 1989), as well as in fields such as Organizational Behavior Managements (OBM), where most of the interventions and research done involves verbal behavior by individuals in an organizational setting (Fox & VanStelle, 2010). OBM exists within the applied branch of behavior analysis and encompasses Performance Management (PM), Behavioral Systems Analysis, and Behavioral Safety (Wilder et al., 2009). The main goal here is to apply behavioral principles for the purpose of creating socially significant behavior within an organization.

For behavioral change to take place within the context of an organization, the environment that the members of a culture exist within is important. Such changes have been observed to be the result of complex interaction between members of a group (Malott, 2016). Unlike the contingencies brought up from operant conditioning procedures, the contingencies that are discussed on the level of cultural selection involve a structure of interaction where a

number of different agents interact with one another to create large scale change, aggregate, that also in turn affect the individual (Malott, 2016). This builds the foundation of what is known as metacontingencies.

Metacontingencies was suggested as the main unit of analysis within cultural selection by Glenn (1988). In this view, the interaction between multiple individuals or agents may result in a change of the environment. Such repeated interaction was called interlocking behavioral contingencies (IBC). This differs from operant contingencies in that the contingency specified in an operant is merely a part of an IBC. The IBC as a whole reflect the behavior of multiple individuals, that develop an aggregate product that is then selected by a receiving system (Glenn, 2010; Glenn, 1988). Thus, the coordination of various IBC's may have an impact on the community or environment in general that may not have been able to happen within the level of the individual (Zagury, 2012).

The Evolved Social Brain

The behavioral flexibility that is required within social settings has been hypothesized to be aided by the hippocampal region of the brain (Rubin et al., 2014). The hippocampus is extensively connected to other structures of the brain that are assumed to be involved in complex behaviors such as social coordination, emotions, and executive functioning (Rubin et al., 2014; Simons & Spiers., 2003; Vuilleumier et al., 2001). Including this, the hippocampus region is also incorporated within the limbic system, the area located at the edge of the two hemispheres (Pessoa & Hof, 2015). This encompasses regions such as the cingulate and the amygdala (Bear & Paradiso, 2020). The former being highly involved with processing of reward and emotional memory, and the latter implicated in detection of emotional facial expression, decision making and processing social information (Vuilleumier et al., 2001, Adolphs, 2003; Hariri et al., 2002; Bechara et al., 1999; Frankland et al., 2004).

This implication suggests that an analysis of the role the hippocampus and the other connected structures will offer a better understanding of the complex dynamics of social groups and how it interacts with the environment (Rubin et al., 2004). The support of the social brain hypothesis (SBH) has been implicated across a number of species, the result being that social species tend to have larger brains than non-social species (Dunbar, 2009; Adolphs, 2003). Between the number of existing explanations for SBH, the most prevalent one involves the idea that the cognitive abilities needed to coordinate the behavior of multiple individuals is more taxing than just coordination of one's own behavior (Adolphs, 2003). This suggest that such demands became a critical factor that can be assumed to have provoked the evolutionary development of bigger brains (Dunbar, 2009).

The implications of studies such as those done by Adolphs (2003) and Dunbar (2009) revolve around the impact receiving this type of understanding will have on the further development of future technologies aimed at improving cooperation. Such information is especially valuable within the business/organization sector, where findings from neuroscience have recently being focused on (Kuhlmann & Kadgien, 2018). This suggests how the social brain has evolved to be malleable and easily influenced by the specific culture or environment that exists around it. This idea has already been advocated for by proponents from both mindset (Elliott & Dweck, 1988; Johnston, 2017; Yeager et al., 2014) as well as those from the behavior analytic perspective (Glenn, 2010; Malott, 2016; Moore, 2018; Skinner, 1981).

A focus on the contingencies around the individual and the culture it exists within could give a better indication on how specific mindsets are nurtured. Just as how the brain has been shown to be highly malleable dependent on specific environmental stressors (Nahum & Bavelier, 2020; Fuchs & Flügge, 2014), so does the behavior of the whole organism contingent upon actual contingencies of social reinforcement (Moore, 2018; Skinner, 1981; Skinner, 1965; Glenn, 1989). The index created by the consultancy agency thus tires to utilize

this knowledge in the development of their questionnaire. However, it should be noted that the index created by the consultancy agency is not the same as the mindset questionnaire that is being advocated by proponents of mindset theory. This is because they are utilizing an index that bases itself on summarizing of multiple simplified indicators (Neuman, 2013). This knowledge for the purpose of further development on interventions that base themselves on mindset theory.

Standardization of Interventions

Currently, different studies utilize different materials to carry out mindset interventions. Some base themselves on lectures, while others present them through computerized systems. Others vary in length, whether the intervention phase lasts across multiple sessions (Yeager et al., 2013) or just a single session (Yeager et al., 2014). Even the type of information or contents of the intervention is not standardized. In some studies, only videos explaining brain function and how it evolves are sufficient as a growth mindset intervention. Including all these, it also varies whether the interventions are passive or interactive (Sisk et al., 2018; Yeager et al., 2013).

In this study the index offered by the consultancy firm in trying to encapsulate the underlying factors that are assumed to correlate with high performance as an attempt at identifying specific environmental events that contribute to performance. This by moving towards explanations that focus on functional relations based on description of observed correlation. Identifying functional relations is a critical step forwards with regard to the development of an instrument for predicting behavior driving the relevant KPI's underlying the sales growth of a company. Rearranging the social environment around the employees with interventions based on feedback, goal setting and reinforcement can evoke specific desirable behavioral patterns (Daniels & Bailey, 2014; Sims & Lorenzi, 1992; Tosti, 1987).

All behaviors happen within a specific context; that context may induce or elicit specific responses from the individual. The context is the various environmental variables that have become important as a result of phylogeny, ontogeny and/or cultural selection (Baum, 2017; Moore, 2018; Skinner, 1981). An analysis of the environment gives explanatory power when understanding how and why individuals behave, so as to be able to influence them (Biglan, 1995b).

Internal Structures

Focusing on the context a behavior has occurred within allows for the proper investigation of how to properly predict and influence behavior (Biglan, 1995a). Such a view omits the need to compare different individuals, groups or communities that might result in accidentally failing to notice specific variables that affect specific populations/individuals and not others. Thus, it emphasizes the importance of finding functional relations between variables that are of interest (Biglan, 1995b).

Mindset is in some cases referred to as lying underneath “the level of consciousness”, meaning that the patterns of behavior that arise from them are unintentional; but rather implicitly affecting what the individual does. Within the languages of behavior analysis or neuroscience, the topic of unconsciousness has been problematic to define and study. Within some cases as explained by Skinner and a number of his contemporaries, humans are to an extent guided and influenced by forces that they are not aware or “conscious” of (Overskeid, 2007). Kahneman (2011) divided decision processes into System 1 and System 2. The former being categorized as fast, automatic and more emotional, while the latter as more reason based.

Skinner distinguished between behaviors that are directly shaped by their consequences and therefore could be compared to non-conscious thinking, and those that were based on a reliance on what can be assumed as conscious effort in finding logical connections:

These systems were labeled contingency-shaped and rule-governed behavior respectively (Overskeid, 2007). The topic of consciousness is also problematic within the field of neuroscience. This topic is frequently eluded, either on the assumption that it is a philosophical matter, or because current technology would not allow scientific investigation of the phenomenon (Crick, 1998). Still, researchers agree upon some basic assumptions about consciousness.

There is general agreement that there are specific neuronal processes correlated with what is termed as consciousness. However, this is just an assumption that has yet to be completely understood. The neuronal processes assumed to be associated with consciousness are called neuronal correlates of consciousness (NCC) (Crick, 1998). Other regions such as the ascending reticular activating system (ARAS) that is usually responsible for wakefulness has been brought forth as a region highly correlated with consciousness. Stimulation of this region produces electrical responses or reactions that are seen as the electric correlate of consciousness (Dahm, 2005).

The brain is not separated from the context in which the individual exists. It is composed of a number of neurons that are themselves a product of inherited genes and gene expression (Crick, 1998). All this is in turn also affected by the experiences that the individual is exposed to. Understanding of neuroscientific findings is based on individual history as well as on the context in which responses occur (Schulkin, 2016). Understanding the brain is dependent on understanding the behavioral responses that happen in relation to stimuli in the environment. A number of fields have dedicated themselves to understanding this. The field of economics has developed a set of theories, such as Bayes' theorem of Bayes updating that deals with the expectancy of specific outcomes based on prior experience (Angner, 2016; Schulkin, 2016).

History of Reinforcement and Verbal Reports

The consideration of an individual's history rather than internal variables when analyzing the observed behavior, whether covert or overt, is prevalent within both behavior analysis and neuroscience (Poppen, 1989). The investigation of an individual's learning history is accessible and analyzed through incorporating verbal behavior. As scientists, there exists strict conventions and frameworks that help govern the way we make or relay information on observed phenomena. These conventions act as rules that control and specify what is to be observed and how to relay it. The development of scientific inquiry can thus be seen as the shaping of verbal behavior of the scientists. As within the paradigms this also helps guide the variables that are deemed as important (ontology) as well as the methodology used to examine them (epistemology).

Relying on an individual's verbal statements and learning history for information has been criticized, since they are impossible to verify independently. An individual's own report may be insufficient or biased, or guesswork about how past events may be related to what is being observed currently (Hayes, 1989). However, a reliance on the verbal behavior of an individual is more easily accessible for others. Verbal behavior and rules arise from the community an individual exists within. This makes it possible for that community to reinforce the way an individual tacts the experiences around them if the two events adequately correspond. Once the external verbal community has differentially reinforced the way an individual tacts, the rules may be internalized by the individual as self-rules (Poppen, 1989). This offers a functional definition on how the behavior of individuals can be influenced by the social environment to the point that it gets 'internalized' by the individual themselves (Hayes, 1989).

Verbal behavior will allow for the achievement of a certain level of prediction and control of an individual's verbal responses. As defined by Skinner (1966) this form of operant control either directly or indirectly specifies the consequences of certain behaviors. Such rules

or verbal stimuli then lead to a pattern of responding can therefore be extracted and utilized to analyze certain past contingencies that the individual has been exposed to (Malott, 1989). On the basis of this the verbal reports that an individual emits can be seen as a bridge that connects the learning history to an observed behavioral phenomena (Skinner, 1974)

Verbal behavior is implicated in a number of studies of depict how it may be relevant in understanding its influence in behavioral change. Studies have mentioned multiple unique effects that verbal stimuli may have on behavior. Such studies mention among others the function altering effect that have been observed by rules (Blakely & Schlinger, 1987), or the discriminative properties that may evoke behavior (Malott, 1993; Catania, 2013) as well as their motivational properties (Langthorne & McGill, 2009). All this is a further testament to how verbal behavior may shape how we view and experience the world around us.

Additionally, this will help in the investigation of events that are considered as private.

Private Events and Technological Development

Events that are considered under the skin or private are only available to the individual having them, unless specific instruments are developed that make them accessible to others. As noted by Skinner (1945) in a number of his works described that these events are still affected by the same external variables as overt behavior. Thus, insinuating that the notion of specific events that stem from within the individual, have an influence on observed behavior is flawed. This has also been seen within the domains of neuroscience where neuronal activity alone cannot be considered as an explanation of behavior due to unknown temporal order of the events (Marr, 1982).

Trying to reach an understanding of human behavior by only analyzing the firing of neural cells while leaving behavior as an after thought will not result in any meaningful conclusions (Krakauer et al., 2017). The neuroscientific field has had a shift within its endeavors due to new technological inventions the field has attained more advanced and

complex sets of data to utilize in the understanding of the human brain. However, this has also resulted in a shift within the ontological considerations that the field used to evaluate.

Questions dealing with understanding the basis for observation, the mechanisms that are correlated with over behavior etc.; were left behind and the focus was placed on finding other individuals that were more versed with the analysis and interpretation of data (Krakauer et al., 2017). This resulted in the field focusing more on technological development rather than the understanding of human behavior and its biological correlate (Krakauer et al., 2017). An account that only deals with neural activity will only result in a description of a phenomenon rather than an explanation of it (Catania, 2000).

Technology-driven neuroscience is not necessarily a disadvantage, given that an equal amount of attention is restored to analyzing the questions that lead to the development of the tools in the first place. New ways of analyzing behavior that will allow for the observation of the nuance and complexities that tends to be present is an important aspect in the science of behavior. Understanding the behavior in its own right and how it correlates with both the environment by which it occurred in and the neuro – and biological correlates that are involved should also be prioritized. Within phylogeny, behavior can be seen as a milestone that allowed individuals to adjust to the environment around them without having to undergo years of evolution via natural selection (Anderson & Perona, 2014).

The behavior analytical perspective incorporated with the neuroscientific field will be able to achieve such an understanding. The technology that is being utilized and constantly developed within neuroscience will allow for the more fine-tuned observations of more subtle responses that are emitted or elicited by the individual as a result of environmental variables. And the methodology and reasoning that the behavior analytic perspective deals with will allow for the focus to be placed back onto the behavior of the individual and how it is influenced by external factors. With this integration of the two fields theories such as mindset

will be able to gain access to both technology and a framework that would make it easier to get into contact with the variables that actually affect the behavioral patterns that are of interest. This can also be assumed to help mindset theory avoid some of the other problems that have been observed within other cognitive or more traditional psychological branches.

Limitations

The study involving mindset theory in investigating employee performance in their work setting has a number of interesting implications for research into human motivation, however, as shown there are a number of limitations as well. The formulation of the individual items within the index needs to be carefully reviewed for attaining a proper representation of the contingencies that the individual is exposed to. The formulations of the items might cause problems of interpretation to the participants. Meaning that in some cases the participants may misinterpret the question and answer in a manner that was not intended (Neuman, 2014).

Utilizing questionnaires limit the number of instruments that can be used to observe a behavioral phenomenon (Neuman, 2014). Asking participants to recall past events about their experience in the time frame it takes to complete a questionnaire might be unreliable. Such memory might be affected by a number of events such as major changes within the environment. The spread of Sars Covid19 has had major effects on the businesses that may have resulted in a reduced employee engagement. Employees that have a high level of engagement are said to “support the organization to attain its mission, execute its strategy, and generate significant business results.” (Chanana & Sangeeta, 2020).

Various types of restrictions were applied to the public as well as businesses in hopes of restricting the further spread of the virus. Such restrictions include lockdown measures, social distancing and the closing down of various businesses, all this can be assumed to have an effect on the certain engagement that can be exhibited by an employee. This then resulting

in the observed results within the stores that were used for this study. The restrictions implemented may have swayed or affected the daily routines or contingencies that are normally present within a specific store. And resulting in a phenomenon known as telescoping such as overreporting recent events and underreporting the more distal ones (Neuman, 2014).

In addition to this, it is important to state that the statistical methods used to analyze the data are not a testament to the questionnaire's capabilities or features. One of the assumptions that are important when undergoing null hypothesis statistical testing is the assumption that the population means of both the experimentation group and the real population means are equal. This however cannot be attained, this carries with it the notion that if our data were to show that the null hypothesis was false, then that would not necessarily be considered as a remarkable feat (Morgan & Morgan, 2008). Thus, the emphasis should remain on the specific description of the contingencies that are described measured within the realms of a single subject design.

Conclusions

Findings from the present study aid in contributing to the continuous research dedicated to analyzing motivation. This with the main focus in the development of specific mindsets that is correlated with specific behavioral patterns. Including this, different fields that share a focus on understanding the behavior of individual have been integrated to depict how complementary their methods and findings are. Behavior is a complex phenomenon that individuals possess and has allowed for the development of a number of characteristics and attributes that results in a magnitude of different consequences. On that account, the study of mindset theory and how it can be further developed by incorporating the behavior analysis and neuroscience can be assumed to be an important endeavor in the attempt to understand behavior and the variables that affect it.

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Tables

Tables 1

The overall score of GMI and KPI from each store.

Store	GMI	KPI
A	76	23
B	59	36
C	50	27
D	45	27
E	39	-1
F	33	41
G	31	28
H	28	9
I	12	20
J	10	38
K	4	4
L	0	22
M	21	34

Note. The score of GMI and KPI as investigated by the consultancy agency across the different stores of Anton Sports.

Table 2

Cronbach alpha measurement

Factor	No. Items	Thershold	Cronbach's alpha
Psychological Safety	5	>.70	.864
Communication	5	-	.894
Motivation	5	-	.680
Curiosity	5	-	.894
Learning	5	-	.869

Note. Alpha scores for each individual factor/subscale from the GMI index. The threshold to determine whether the results are vaiable was placed as greater that .70.

Table 3*Regression analysis*

Factor	B	SE B	β	t	p	R ²
Psychological safety	3.458	7.482	.138	.462	.653	
Communication	2.271	7.060	.097	.322	.754	
Motivation	4.966	8.129	.181	.611	.554	
Curiosity	3.046	7.100	.128	.429	.676	
Learning	10.646	8.390	.357	1.269	.231	

Note. Regression analysis of the factors from the GMI**Table 4***Pearson's product correlation*

	KPI	GMI
KPI	1.000	.158
Sig. (2-tailed)		.605
GMI	.158	1.000
Sig. (2-tailed)	.605	

Note. Pearson's product correlations between the variables GMI and KPI

Appendix

Ethical considerations

This appendix consists of the ethical concerns that might be raised by the current study. The Norwegian Data Protection Authority (NSD) was contacted before the data from the consultancy agency was delivered for this study. However, after extensive deliberation with representatives from NSD as well as those from the consultancy agency it was concluded that we did not need to apply for approval to carry on with the analysis of the data. The basis for this decision mainly centering around the fact that no personal data from the participants that underwent the questionnaire was obtained.

For the purpose of this study, there was neither a direct data collection phase nor an intervention phase. The data had already been collected and studied by the agency and is only used as a supplementary information to build up on the relevant research topics touched upon. Thus, considerations pertaining to participants potential exposure to practices that would infringe on their rights for ethical and humane treatments as well as data management was not relevant for us.

The consultancy agency that the data was obtained from had already anonymized the data from the varying stores. The anonymized raw data that was received for this study is impossible to track down to the single individuals that participated. The management of data was therefore considered to be a responsibility that the consultancy agency had to oversee. The current study utilized steps to anonymize the specific stores by not disclosing the name of the consultancy agency as well as the location of the stores used in the study.

Meldeskjema for behandling av personopplysninger about:blank

NSD NORSK SENTER FOR FORSKNINGSDATA

Meldeskjema 609442

Sist oppdatert
01.02.2021

Hvilke personopplysninger skal du behandle?

Type opplysninger

Skal du behandle særlige kategorier personopplysninger eller personopplysninger om straffedommer eller lovovertrедelser?

Nei

Prosjektinformasjon

Prosjekttittel
Growth mindset: kultur, biologi og læring

Prosjektbeskrivelse
Data fra en forretningskjede, på aggregert nivå for enkeltfilialer. Personvernrådgiver fra OsloMet anbefaler at det etableres en dataoverføringsavtale.

Dersom opplysningene skal behandles til andre formål enn behandlingen for dette prosjektet, beskriv hvilke

Analyse av sammenhenger mellom data fra spørreundersøkelser og økonomiske resultater i filialer i en større kjede av detaljforretninger.

Begrunn behovet for å behandle personopplysningene

Teoretisk drevet studie med sikte på å teste hypotese om korrelasjon mellom såkalt growth mindset-kultur (målt ved spørreundersøkelser gjennomført anonymt ved den enkelte filial) og forretningsmessig suksess(bunlinje per filial).

Ekstern finansiering

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Meldeskjema for behandling av personopplysninger about:blank

Type prosjekt
Studentprosjekt, masterstudium

Kontaktinformasjon, student
Esnath Julius Mwaiselage, s313108@oslomet.no, tlf: 94145550

Behandlingsansvar

Behandlingsansvarlig institusjon
OsloMet – storbyuniversitetet / Fakultet for helsevitenskap / Institutt for atferdsvitenskap

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)
Gunnar Ree, gree@oslomet.no, tlf: 91607580

Skal behandlingsansvaret deles med andre institusjoner (felles behandlingsansvarlige)?

Nei

Utvalg 1

Beskriv utvalget
Ansatte i ulike butikker fra to forskjellige kjeder

Rekruttering eller trekking av utvalget
Rekruttert via presentasjon av forskningsprosjektet for ledelsen i ulike selskaper. Dataene er samlet inn inn fra de selskapene som har ulike butikker, dvs at det er alle ansatte i disse butikkene som er valgt ut.

Alder
18 - 70

Inngår det voksne (18 år +) i utvalget som ikke kan samtykke selv?

Nei

Personopplysninger for utvalg 1

Hvordan samler du inn data fra utvalg 1?

Elektronisk spørreskjema

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Meldeskjema for behandling av personopplysninger about:blank

Grunnlag for å behandle alminnelige kategorier av personopplysninger
Samtykke (art. 6 nr. 1 bokstav a)

Informasjon for utvalg 1

Informerer du utvalget om behandlingen av opplysningene?
Ja

Hvordan?
Skriftlig informasjon (papir eller elektronisk)

Tredjepersoner

Skal du behandle personopplysninger om tredjepersoner?
Nei

Dokumentasjon

Hvordan dokumenteres samtykkene?

- Elektronisk (e-post, e-skjema, digital signatur)
- Manuelt (papir)

Hvordan kan samtykket trekkes tilbake?
De ansatte innenfor de ulike kjedene har kontakt med ledelsen angående dette

Hvordan kan de registrerte få innsyn, rettet eller slettet opplysninger om seg selv?
Gjennom kontakt med ledelsen for den kjede de er ansatt i.

Totalt antall registrerte i prosjektet
100-999

Tillatelser

Skal du innhente følgende godkjenninger eller tillatelser for prosjektet?

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Meldeskjema for behandling av personopplysninger about:blank

Behandling

Hvor behandles opplysningene?

- Private enheter

Hvem behandler/har tilgang til opplysningene?

- Student (studentprosjekt)
- Databehandler
- Andre med tilgang til opplysningene

Hvilken databehandler har tilgang til opplysningene?
Nudgeit

Andre som har tilgang til opplysningene
Jon Ivar Johanesen

Tilgjengeliggjøres opplysningene utenfor EU/EØS til en tredjestat eller internasjonal organisasjon?
Nei

Sikkerhet

Oppbevares personopplysningene atskilt fra øvrige data (koblingsnøkkel)?
Ja

Hvilke tekniske og fysiske tiltak sikrer personopplysningene?

- Opplysningene anonymiseres fortløpende

Varighet

Prosjektperiode
01.01.2021 - 15.06.2021

Skal data med personopplysninger oppbevares utover prosjektperioden?
Nei, data vil bli oppbevart uten personopplysninger (anonymisering)

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Meldeskjema for behandling av personopplysninger about:blank

Hvilke anonymiseringstiltak vil bli foretatt?

- Annet

Har kun anonymisert data i utgangspunktet, ingen personopplysninger.

Vil de registrerte kunne identifiseres (direkte eller indirekte) i oppgave/avhandling/øvrige publikasjoner fra prosjektet?

Nei

Tilleggsopplysninger

From: Lasse Andre Raa <Lasse.Raa@nsd.no>
Sent: Wednesday, February 3, 2021 3:31 PM
To: Eirik Dåstøl Langeland <eirikdas@oslomet.no>
Subject: SV: Oppklaring fra NSD

Hei

I utgangspunktet ikke, så lenge datasettet de utleverer til studentprosjektet er helt anonymt. Det stiller imidlertid noe høyere krav til Nudgeit med hensyn til å bearbeide dataene til anonym form. Datasettet som utleveres kan ikke inneholde løpenumre som kan kobles til person ved bruk av koblingsnøkkelen. En måte å løse dette på, kan være at datasettet utleveres med tilfeldig genererte løpenumre, det vil si at det anonyme datasettet i studentprosjektet har andre løpenumre enn Nudgeits eget datasett med personopplysninger.

Med vennlig hilsen

Lasse Raa
Seniorrådgiver | Senior Adviser
Seksjon for personverntjenester | Data Protection Services
T: (+47) 55 58 20 59

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