

THE IMPACT OF LEARNED BEHAVIORS IN THE ART OF SHOOTING PENALTIES

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This paper is a thought experiment that attempts to find tentative explanations, from a behavioral perspective, for what happened with the Peruvian soccer player, Christian Cueva, and why he didn't participate in the penalty shootout that deprived the Peruvian team from the opportunity to be part of the 2022 Qatar World Cup. The paper analyzes widely known principles of learning such as classical and operant conditioning, and how its subsequent phenomena, like one-trial learning and extinction, can be applied to elite sports players. Memory will also play an important role since renewal effect and reinstatement can explain how retrieval failure influences and determines behavior due to exposition to certain environments or specific visual cues. Lastly, the paper explores what motivates a person to get involved in a highly stressful activity like shooting a transcendental penalty, and how operant conditioning can provide a powerful explanation to specific behaviors that could be perceived as aversive by the public. Understanding how we acquire knowledge through association, and how this new information influences our behavior, could make a huge difference when we are in leadership positions and our performance dictates the outcome of a goal that took us years of hard work; and in a developing society, such as Peru, resistant to accept the influence of psychology phenomena in sports like soccer, this type of work finds meaning as a cultural and academic contribution to the field of psychology.

It is the second half of the extra time that will determine who will get the last spot for the 2022 Qatar World Cup. The game is still tied between Peru and Australia, 0-0; suddenly, Christian Cueva, a vital midfielder, lies down on the pitch and claims to be injured. After a brief conversation between Cueva and the team doctor, the player is substituted, and this means that he will not take any action on the penalty shootout that will grant Australia the final ticket for the coveted competition. Two days after what was catalogued by the Peruvian media as the worst failure in their sports history, it was revealed that Cueva only had a hamstring cramp, and he was not severely injured during the game. This raised many questions among Peruvians due to the conflictive relationship that the

talented player had with them, which was originally triggered by an event that took place four years before the decisive play-off against Australia. In 2018, Peru qualified for the soccer world cup after 36 years of prolonged absence, and Christian Cueva was one of the most important players in the achievement of that goal. However, during their first game in the 2018 Russia World Cup, with the entire country watching the game thanks to a perfectly timed holiday declared by the Peruvian president, Pedro Pablo Kuczynski, Cueva missed a penalty during first half, and Peru ended up losing the game against Denmark. Since that day, he received a disproportionate amount of criticism from the media, soccer fans, and even casual observers, since he was blamed for one of the biggest disappointments of the new century. And within this context, it did not take long until an obvious question arose among Peruvians: was Cueva really injured or did he just feign the injury so he would avoid taking a penalty against Australia and confront another potential failure?

The goal of this paper is not answering that particular question, but to explore how soccer players can be affected by learning and memory from a behavioral perspective. Three hypotheses will be suggested for potentially explaining Cueva's behavior facing the responsibility of shooting a penalty, all of which are built upon the premise that he acquired an aversive response thanks to classical conditioning and one-trial learning. The first hypothesis is memory retrieval failure through renewal effect by being exposed to the same context where the player was originally conditioned; second, also associated with retrieval failure, is reinstatement effect, given the presentation of the unconditioned stimulus before facing the conditioned stimulus; and lastly, voluntary avoidance of a non-rewarding situation thanks to operant conditioning and punishment. Nonetheless, it's important to clarify that this is an exercise that pertains to the realm of hypothesis, and it doesn't vouch or suggest any type of premise that should be accepted as real.

CONTEXT

In South America, soccer goes beyond the scope of being just a popular sport. Historically, it has been used by politics to deviate the attention of people towards specific regulations that could be perceived as controversial. One of the more popular examples for this type of tactics was the Operation Condor, an infamous secret alliance formed among countries

in South America in the 70's, with the purpose of exchanging political prisoners to capture, extradite, torture, and murder them, looking to obtain stability for their governments (Vásquez, 2019). This secret operation peaked when the 1978 Soccer World Cup was hosted—and lately won—by Argentina, one of the leaders of the operation. This title has always been discussed as a rigged championship, with the goal of maintaining the population distracted from the atrocities that took place during that year in Argentina (Gotta, 2008).

Within this context, it is time to analyze what the 2018 Russia World Cup represented for Peruvians. Peru was finally able to participate in a World Cup after 36 years of absence, and this represented the opportunity for a large percentage of new generations to go through the novel experience of watching their team play in one of the most watched sports competitions around the world. About fifty thousand Peruvians travelled an average of 32 hours to Russia to watch at least one of the three games that Peru would play during the competition (Pinzon, 2018), and the huge expectation built upon those three games was not different for the Peruvian players, since none had been born before Peru's last World Cup game in 1982. Tragically for Peruvians, the first game ended up being a loss against Denmark, 0–1, and Christian Cueva was the main protagonist of the game: he missed a penalty during the first half, while the game was still 0–0.

Understanding the social implications that an event like the 2018 Russia World Cup had in the Peruvian society is important for this paper because it provides information on the magnitude of the stimulus that Cueva went through when he shot the penalty. It will provide some context for analysis on how Cueva could have been conditioned based on one-trial learning.

LITERATURE REVIEW

CLASSICAL CONDITIONING AND THE POWER OF ONE-TRIAL LEARNING

Classical conditioning is a type of learning that has been widely studied and that is part of the core concepts that constitute behaviorism. It states that animals can learn how to respond to specific stimulus based on prediction of an outcome. This concept requires four elements

that are identified as the unconditioned stimulus (US), unconditioned response (UR), conditioned stimulus (CS), and conditioned response (CR). The association was originally studied by Pavlov, and he used the activity of feeding his dog as his main focus of study when it came to this phenomenon. He realized that every time his dog was presented with food (US), it will start to salivate (UR) as a physiological response intrinsically attached to hunger; he then decided to pair a bell sound (CS) with the presentation of food, and after several trials, the dog will eventually start to salivate (CR) by the sound of the bell, based on the anticipation that there will be food presented soon after the sound. In this example, the dog learned to associate the bell sound with the food, and he also learned how to respond to this stimulus based on the prediction of the outcome, which was receiving food.

Now it is time to analyze how classical conditioning can be applied in the context of a soccer player shooting a penalty. It only takes a couple of minutes to google the words “Cueva” and “penalty” to understand the disproportionate amount of destructive criticism that Cueva was exposed to by the media and public after he missed the penalty in the game against Denmark during the 2018 World Cup. From a behavioral perspective, I will hypothesize that after Cueva missed the transcendental penalty, he was conditioned by its tragic outcome: general disapproval and criticism. In this scenario, the US is exposure to criticism, and the UR is experiencing a feeling of pain by disapproval. Once Cueva missed the penalty, he learned to associate the activity of shooting a penalty (CS), with a painful outcome (CR); but there is one big consideration that this framework requires and that is missing in this scenario: it takes several trials to pair two stimuli with an almost identical response. At the end of the day, repetition is what cements the strength of the association between the stimulus and behavior (Roediger III & Arnold, 2012). However, this is when one-trial learning comes in handy.

One-trial learning has been studied as a phenomenon that is exclusive to specific circumstances when it comes to classical conditioning. For instance, this is predominantly found in conditioned taste aversion, and the idea behind this concept is that it only requires one-trial exposure to acquire full conditioning to the presentation of a stimulus. Edwin Guthrie, a prominent psychologist associated with behaviorism, was one of the

main supporters of the idea that learning only took one trial to obtain full acquisition from a stimulus. Moreover, he justified the common graph that is found in the learning curve after different trials by proposing that the graph was only the consequence of associations that are created with the different elements that are part of a stimulus during trials (Bouton, 2016). This was later supported by Irvin Rock, a psychologist specialized in perception, who was also intrigued by the role of repetition when it comes to building associations. He was responsible for a study that was based in learning a set of paired letters and testing the strength of the associations among them, based on repetition and one-trial learning. What he hypothesized was that participants did not get better at this task just because repetition works as some type of practice or reinforcer that strengthens the associations; it is actually because they are only capable of making a limited number of associations at the same time (Rock, 1957).

Evidently, this phenomenon has been heatedly debated among researchers since it usually takes repetition to learn when it comes to most types of association; but it is clear that one-trial learning can happen under certain circumstances, and one of them is associated with the salience of the unconditioned and the conditioned stimulus (Bouton, 2016). If I take this into account, it is widely known that one of the most stressful experiences that any person can go through during a soccer game, either as a spectator or a direct protagonist, it's resolving a game in a penalty shootout. It is a duel between the goalkeeper and the penalty taker that sixty thousand people in the stadium, and millions of people in front of a screen around the world, are witnessing: the spotlight effect. If I extrapolate this to the penalty shot by Cueva and consider the variables 1) the penalty he shot was the first penalty ever confirmed by the new VAR technology established by the FIFA that year, 2) it was shot during the most important competition of the most popular sport across the world, and 3) the image of millions of Peruvians watching the game, it is not delusional to consider that the stimulus of shooting a penalty that day was very powerful.

DID CUEVA STOP SHOOTING PENALTIES?

Adhering to the theory of one-trial learning and classical conditioning, after what happened in 2018, Cueva would have stopped shooting penalties due to the conditioning that he went through based on the

consequences previously mentioned; but this did not happen. For a player of his exceptional talent, it is difficult to avoid the responsibility of shooting a penalty since he had a high success rate at this task prior to the incident during the 2018 World Cup. According to Transfermarkt, a website with a soccer database, Cueva had only missed two out of a total of 20 penalties he shot in his entire career before the game against Denmark. Based on the data, it is fair to say that he was a good penalty taker (as a matter of fact, that was probably the main reason why he volunteered himself to shoot the penalty during the game against Denmark). However, it took him two years to shoot a penalty again. It was not until February of 2020 that he took the responsibility of shooting a penalty during a game with his former club, Club de Futbol Pachuca. Between 2020 and 2021, he shot three penalties and scored all of them. I will call this, the process of extinction.

Extinction is the decay of a learned behavior in the absence of the unconditioned stimulus when the subject is exposed to the conditioned stimulus (Mowrer, 1939). When Cueva successfully scored a goal in the penalties he shot during 2020 and 2021, it could be hypothesized that he stopped pairing shooting a penalty with going through a painful experience. Nevertheless, there is something important to consider in the extinction trials that he went through during those years: those trials were performed in a different context than the original event that took place in 2018. First, there were no fans in the stadium due to the spread of Covid-19. The public was prohibited from attending soccer games in most countries across the world, and the penalty kicks he shot during the extinction trials were in competitions that did not have the transcendence of the soccer world cup (one was shot while playing in the Mexican first division, and the other two while playing in the Saudi League). The difference in the context of the extinction trials gained importance in July of 2021, when Peru and Paraguay faced each other in the quarterfinals of the Brazil Copa America, an important soccer competition in South America.

During the penalty shootout to determine which team will qualify to the semifinals, Christian Cueva was in charge of shooting the fifth and decisive penalty with the option to qualify Peru to the next round if he scored the goal. The outcome? He missed it. The Paraguayan goalkeeper blocked the goal; but this time, the consequences were not only criticism,

but also satire: *Who was the genius that put Cueva in charge of the final penalty given his record?* was the main questions among Peruvians. Peru still qualified to the next round thanks to an outstanding performance of their goalkeeper, Pedro Gallese, but extinction suffered a step back, and now the consequences of the event reinforced the way he started to appraise shooting penalties. *Is it really worth taking the risk of shooting a penalty in exchange of all the criticism associated with missing?* Operant conditioning might have an answer.

OPERANT CONDITIONING, FRUSTRATION, AND MOTIVATION

It is widely known that when soccer teams are about to enter a definition via penalties, it is the responsibility of the coach to come up with a list of the initial five takers and then give the list to the referee in charge of the game (in the past, they needed to respect the names and the order stipulated in the list, but nowadays the order is interchangeable). What teams usually do before coming up with the names of the list, is to ask for volunteers; but why would someone ever decide to expose themselves to a highly stressful situation of being in charge of taking a penalty during a frantic penalty shootout? The answer lies in the reward. The most coveted asset in soccer is scoring goals. If a match ends 1–0, the MVP of the game will be the player who scored the one goal. Goals in a sport like soccer are not necessarily abundant, so having the chance to be the main protagonist of the match and take all the praise associated with it is a strong motivation based on a considerably pleasant reward.

Operant conditioning is another type of associative learning that is based on the response generated by a specific behavior. It is how behavior is controlled by the consequences of actions, and this could be done through either punishments or rewards. When it comes to sports, if we receive a reward (praise), it reinforces the behavior; and if we receive a punishment (criticism), then we learn to avoid that behavior and that way we decrease the chances that it could happen again (Leeder, 2022). In Cueva's case, before the game against Denmark, he shot 18 penalties that were reinforced with general praise since he scored in all of them. Even two penalties were shot with the Peruvian national team during the 2018 Russia World Cup Qualifier against Ecuador and Argentina. He associated the success of shooting a penalty with the powerful reward of

fifty thousand people screaming “goal” in the stadium, his name being all over the media receiving praise from the public and being a trending topic on Twitter during the next 24 hours. Volunteering to shoot a penalty is an acquired motivation, which is a motivation not influenced by drives or needs, but learned through experiences (Bouton, 2016). Players learned that the reward of scoring a goal via penalty is more powerful than the unpleasant feeling of the stress and anxiety experienced before taking the shot; but what if the penalty does not end in a goal? Then frustration and how it influences behavior is important to analyze in this scenario.

“All I can do now is work twice as hard to be what I can be” (James, 2018), said Christian Cueva a couple of days after missing the penalty kick against Denmark in 2018. It is interesting to analyze this phrase from the perspective of how frustration influences behavior. Frustration can be defined as an emotion that is experienced when not being able to accomplish a goal; but one of the main features of frustration is that it energizes behavior. In a study performed by Amsel and Roussel (1952), they reported how hungry rats responded to frustration elicited by the absence of a reward (food) when they expected that specific reinforcer. Whenever rats did not receive the reward, they started behaving in a more energetic way. This led the researchers to propose that, “frustration is a motivational state.” The problem is that we do not know how this energy is catalyzed: it could be by running away, avoiding the exposure to the same event, or by reengaging in the same task looking to finally accomplish the initial goal. Based on what Cueva said, it is fair to assume that he showed signs of focusing that energy into the idea of putting extra work to be prepared whenever he was presented again with the chance of accomplishing a goal that previously represented misery and suffering for him. If I analyze his statistics after the game against Denmark in the 2018 Russia World Cup, and before the game against Australia in 2022 World Cup Play-off, he shot 10 penalties and he had an 80% success rate; however, from those 10 penalties, only one of them was taken during a game with his national team, and regrettably, he missed it. It is important to make this distinction because, as previously stated, context is essential. The frustration that he went through when he missed the penalty kick during the 2021 Brazil Copa America could have energized his behavior in a completely different way than what was shown before based on the

initial statement in this paragraph; in the next section I explore the initial discussion and the events that took place in June of 2022, during the Qatar World Cup Play-off match between Peru and Australia.

DISCUSSION

RENEWAL, REINSTATEMENT, AND MEMORY

Even though the word extinction might be associated with total or complete disappearance of a specific element, this semantic connotation does not apply when it comes to behavior. Pavlov introduced the idea that it was not feasible to extinguish a behavior in its entirety, and that the real process behind extinction might be involved with the association of specific elements as inhibitors for the undesired behavior (Bouton, 2016). He suggested this based on the encounter of spontaneous recovery, which is the return of a previously extinguished behavior while being exposed to the conditioned stimulus after some time has passed since the last trial was performed. In Cueva's case, he might have identified elements like the type of competition he was playing at as an inhibitor for pain as a conditioned response for shooting a penalty. Since most penalty kicks he shot from 2018 to 2022 were only for local competitions with the Mexican and Saudi Arabian soccer leagues, the elements that worked as inhibitors during the extinction trials could have been the lack of cues in the stadium involving national jerseys, lack of proper protocol ceremonies (national anthems) dictated by the FIFA whenever an international game is played, no extra time, no World Cup merchandise in the banners, the absence of his teammates and coach from the Peruvian national team, among others. The problem was that during the game against Australia, all those cues mentioned before were there, and this made Cueva vulnerable to renewal effect.

Renewal effect is a retrieval failure in memory that happens when trials for extinction of a behavior have been performed on a context that differs from the one originally associated to the behavior. The subject might go through extinction successfully, but once they are placed in the original context where the behavior was learned, they will show the same response before the extinction trials. Bouton and King (1983) conducted four different experiments in order to understand how the context could affect extinction when it comes to fear conditioning. They found that when rats went through the process of extinction in a different context where

the conditioning pairings were done, once they were exposed to the original context and then to the conditioned stimulus for a new test, the fear towards the CS was renewed. This is the first option for what could have happened with Cueva. As the clock was getting close to the 120-minute mark that dictated the end of the game, he started to identify elements that were part of the original stimulus presented when he missed the penalty against Denmark (e.g. the extra time). A few minutes away from the penalty shootout, he found himself responding involuntarily to the imminent presentation of the stimulus that he learned to associate with pain, and this pain was focalized on his hamstring, bursting into a cramp that did not allow him to keep playing.

The second option is also related with a retrieval failure in memory, and it is reinstatement. Reinstatement differs from renewal effect because the first does not require the return of the subject into the initial context where the behavior was originally learned; instead, it involves the exposition to the unconditioned stimulus itself, eliciting the same behavior when exposed to the conditioned stimulus prior to extinction trials. In a study conducted in 1975, rats that were previously fear-conditioned to a tone of 1,800hz (CS) paired with the presentation of an electric shock (US), went through an extinction process that consisted of five days of exposition to the CS without the US. The next day, researchers exposed the rats only to the electric shock, and when they tested their response to the tone, rats showed fear conditioning even though the extinction process seemed to be successful during those previous five days (Rescorla & Heth, 1975). It is important to consider that five minutes before the initial 90 minutes of the game were over, Cueva laid down on the pitch and requested medical assistance. This happened 25 minutes before he was substituted, and this time he professed pain in his right hamstring. He was checked by the doctor, and Cueva continued playing. What is of paramount importance in this event is that when the game was stopped so the doctor could check on him, the Australian public started booing Cueva because they believed he was feigning the injury and trying to waste time to end the game in a draw (this is a common practice in soccer). This small exposition to criticism, combined with the possibility that during the break his teammates reminded each other to be aware of the imminent chance of resolving this game in a penalty shootout, could have

elicited the reinstatement of Cueva's behavior when being presented with the conditioned stimulus, and triggered the cramp on his left hamstring that took him out of the game in the 115th minute.

LACK OF MOTIVATION

The last option I will discuss here—and probably the most controversial one—is the lack of motivation to participate in a penalty shootout due to learned avoidance based on potential punishment. Through operant conditioning, Cueva learned not only once, but twice, that shooting a penalty while playing with his national team, could lead to huge amounts of suffering, frustration, and feelings of failure. In a context where social media represents a huge parameter of approval or disapproval for our actions, soccer players are not the exception of this new world. The second time he missed a penalty with the Peruvian national team during the 2021 Brazil Copa America, he received a disproportionate amount of destructive criticism from all types of media; and unlike what apparently happened when he missed the penalty in 2018, this time his frustration energized a behavior that was more related to avoidance rather than reengagement. Through different trials, he learned that the possible reward did not justify engaging in shooting a penalty with his national team, and he ended up deciding that it was better to use a cramp in his left hamstring as an excuse to not participate in an action that could have extremely unpleasant consequences for him. Another element that supports this possibility is the different statements provided by retired soccer players criticizing Cueva for leaving the pitch and not participating in the penalty shootout that left Peru without the final ticket for the coveted world cup. They argued that a cramp is usually not a strong enough reason strong enough to be substituted due to the low intensity/brevity of pain that players experience with this injury, and also because of how transcendental the game was (La Republica, 2022).

CONCLUSION

I still remember the day that Peru played against Denmark in June of 2018. The game was on a Saturday morning at 10:00 am. I woke up at 7:00 a.m. to watch the previous game between Argentina and Iceland, and I had breakfast with my dad who had traveled from Peru to Utah to watch the game with me. I am convinced that Christian Cueva has a similar—or even more—vivid memory about what happened that day, and

most importantly, of the event that conditioned him for a good portion of his career. It is impossible to determine what really motivated him to leave the pitch four years later during the game against Australia, and the importance of this paper does not rely on resolving that question, but to offer tentative ideas that could explain the event from a behavioral perspective for academic purposes.

It is important to understand how conditioning happens everywhere, every time; and even though we might not be fully aware of how much we are exposed to the influence of conditioning when it comes to learning and expanding our repertoire of behaviors, we should be conscious of how this determines our responses when facing different stimuli throughout our lives. It is also important to highlight that through renewal effect and reinstatement, even after the process of extinction, the previously learned behavior can return anytime if we are exposed to the required context. This does not mean that we do not have any autonomy over the things that condition us in our lives and how they dictate our behavior; on the contrary, it shows us the necessity to understand their role, and learn how to live with it. It is a beautiful metaphor that states that at some degree, we can't escape from the things that have shaped us in the past.

Christian Cueva is, nowadays, an almost retired player due to his poor performance during the 2023 soccer season. He has been involved in different scandals with alcohol consumption, and fined by his current club, Alianza Lima, for not showing up to regular training sessions. And only three years ago, he was playing the 2022 Qatar World Cup Playoff with Peru. Would his life have been different if he had not missed the penalty in 2018? Maybe if he would have been aware of the consequences of this powerful event and approached it from a behavioral perspective, he would not have left the pitch in 2022 and played in a second soccer world cup. But maybe the Peruvian team still wouldn't have qualified even if he scored his penalty. This is all counterfactual and fostered by the many hypotheses I can think of influenced by mere uncertainty. However, memory and learning can provide us with certainties on how previous experiences determine our responses and behaviors. Ultimately, it is like Jimmy Gator said in the critically acclaimed film *Magnolia*, "we might be through with the past, but the past ain't through with us."

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