

Esports and the requirements for communication: analyzing  
*Counter-Strike: Global Offensive* as a professional game

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## **Abstract**

The purpose of this thesis was to gain an understanding of how essential communication is for esports athletes. This study focused on the game *Counter-Strike: Global Offensive* and the communication required to succeed at the highest level in this particular first person shooter game. Cognitive requirements, stressors and challenges were taken into consideration before analyzing the communication of a professional CS:GO team.

The methods and materials that were used were taken from the field of psychology and literature on video gaming. Literature was studied closely and many different points of view were taken into consideration, such as the physical and mental health of the esports athlete.

This thesis explained the input and output systems of the professional esports athletes. This method of analysis was done with the information in Patricia Miller's book, *Theories of Developmental Psychology*, using Information Processing Theory as my methodological standpoint. As empirical data was not used in this particular thesis, the conclusions that were reached was done by deducing the facts underlined in Information Processing Theory combining them what was visible and audible within the round that was analyzed.

This thesis found out that esports athletes make complex decisions based on the visual stimuli they are exposed to. They make short and informative call-outs, make pinpointed actions with their mice and keyboard while receiving mass amounts of visual and auditory stimuli that is also being processed continuously. All of this is done in a very short timeframe and it is repeated throughout the whole match. The main finding is, however, that communication is the most important thing in competitive esports. Communication was one of the factors that assisted Mousesports to achieve victory in the tournament.

## Tiivistelmä

Tämän kandidaatintyön tarkoitus on ymmärtää kuinka tärkeää ja olennaista kommunikaatio on e-urheilijoille. Tässä työssä painopiste on kommunikaation välttämättömyys e-urheilijoilla, jotka kilpailevat korkeimmalla tasolla *Counter-Strike Global Offensive* -pelissä. Kognitiiviset edellytykset, erilaiset stressitekijät ja haasteet kommunikaation kannalta otettiin myös huomioon.

Työssä käytettiin tutkimuksia psykologian alalta sekä videopelaamiseen liittyviä tutkimuksia. Kirjallisuutta tutkittiin laajasti ja monipuolisesti ottaen erilaisia näkökulmia huomioon, kuten e-urheilijoiden fyysinen ja psyykkinen terveys.

Tässä kandidaatintutkielmassa pyrin selittämään e-urheilijoiden sisääntulo- sekä ulostulojärjestelmät. Tämä analyysimenetelmä perustuu Patricia Millerin kirjassa *Theories of Developmental Psychology* olevaan tietojenkäsittelyteoriaan. Teoria perustuu siihen, että ihminen toimii kuin tietokone: ärsykkeet, eli sisääntulot, prosessoidaan ja niistä luodaan jonkinlainen ulostulo. Tämä teoria toimi metodologisena näkökulmanani työssä. Tässä työssä ei käytetty empiiristä dataa, mutta päätelmät, jotka saavutettiin saatiin päättelämällä tietojenkäsittelyteorian informaation ja analysoidun turnausvideon tiedon perusteella.

Tässä työssä selvisi, että e-urheilijat kykenevät tekemään monimutkaisia päätöksiä altistuttuaan visuaalisille ja auditiviisille ärsykeille. He pystyvät kertomaan lyhyesti ja informatiivisesti olennaista tietoa joukkuetovereilleen samalla, kun he itse tekevät päätöksiä perustuen visuaalisiin sekä auditiviisiin ärsykeisiin, joille he ovat altistuneet jatkuvasti. Nämä päätökset johtavat toimintoihin, joita voi olla esimerkiksi hiiren liikutus, näppäimistön käyttö, tiedon jakaminen tai kaikki nämä asiat yhtäaikaisesti. Kaikki nämä toiminnot suoritetaan hyvin pienellä aikavälillä ja tätä tapahtuu koko pelin ajan. Kaikista tärkein löydös on kommunikaation välttämättömyys e-urheilijoille. Kommunikaation avulla MouseSports voitti tämän turnauksen.

## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>5</b>
<b>2</b>	<b>Description of the research material.....</b>	<b>8</b>
<b>2.1</b>	<b>Definition of Esports.....</b>	<b>8</b>
<b>2.2</b>	<b>Communication in Counter-Strike Global Offensive.....</b>	<b>9</b>
<b>2.3</b>	<b>Analyzing communications of esports professionals.....</b>	<b>10</b>
<b>2.4</b>	<b>In-game jargon and information.....</b>	<b>12</b>
<b>3</b>	<b>Theoretical and methodological framework .....</b>	<b>14</b>
<b>3.1</b>	<b>Information Processing Theory.....</b>	<b>14</b>
<b>3.2</b>	<b>Cognitive requirements of video games.....</b>	<b>15</b>
<b>3.3</b>	<b>Stressors of esports and their effects on communication.....</b>	<b>17</b>
<b>4</b>	<b>Analysis – Presentation of the analysis and findings.....</b>	<b>19</b>
<b>4.1</b>	<b>Analysis of a round – Mousesports versus Astralis .....</b>	<b>19</b>
<b>4.2</b>	<b>Input and output of the players.....</b>	<b>22</b>
<b>4.3</b>	<b>Results.....</b>	<b>23</b>
<b>5</b>	<b>Conclusion .....</b>	<b>25</b>

## 1 Introduction

This thesis will examine competitive Esports and whether communication is a crucial aspect of winning high tier tournaments. Cognitive processes that are present and required while playing in a competitive environment are studied and considered. This study will research data published in esports' field and combine it with studies done in psychology regarding communicational abilities in individuals and the cognitive processes involved while using extensive communication amidst playing. This thesis will work as a basis for my Master's thesis, in which I will conduct a survey on a local Esports site; however, this study is entirely whole and functional on its own.

Esports is a rising trend, and millions of people of all ages are involved in video games. That is why it is essential to study the effects video games have on the individual. For example, competitive video game titles, such as *Counter-Strike Global Offensive*, require extensive coordination within the teams. This coordination comes with hundreds of hours of practice and a healthy team dynamic. This thesis aims to examine whether communication is the crucial factor for competitive esports teams, or is it enough if the players are mechanically skilled enough to win games without having to rely on communicational aspects all of the time. I have personal experience in competitive esports, and I know the requirements required to become a professional esports athlete. Therefore, this study aims to produce relevant information about the social effects and the cognitive requirements that competitive video gaming has on the players.

The materials used in the thesis will be from the field of psychology and video gaming. This study's methodological approach will consist of looking at previous research on video gaming and its general effects on people. I will be adding a new viewpoint with psychological studies regarding the cognitive and social side of gaming. Empirical data will be collected in my Master's thesis.

Problems that may arise within the study might be the lack of relevant sources regarding this topic. To tackle this problem, I might have to rely on sources that are not peer-reviewed. On top of this, I do not possess empirical data on this subject. Therefore, it is not possible to draw conclusions about the theory

I will be using in this study. However, it can help us gain understanding of the complex cognitive processes that are present when esports athletes are playing.

The primary source for understanding how complex communicational situations form and how they are understood in a context where there are different kinds of stimuli will be through Miller's *Theories of Developmental Psychology*. This book will help us understand how people respond to stimuli, what kind of processes are involved when handling stimuli, and how responses are built after being introduced to the stimuli. I will build a solid base regarding how communication is built through *input* and *output* systems and cognitive psychology so that the reader will get a clear idea of how these things work, especially in the world of esports and esports athletes.

Playing video games requires an immense amount of actions done simultaneously. Fine-tuned motor skills are necessary, for example, using the keyboard simultaneously with the mouse and doing extremely pin-pointed actions with it and the cognitive effort needed to make continuous decisions on the next moves in-game. Lastly, the individual has to communicate these actions to the team while taking in mass amounts of information on the screen. While the motor skills are somewhat autonomous, comparable to riding a bike or writing something on a piece of paper for non-gamers, one does not need to think about it actively; instead, it just happens due to endless hours of practice. However, to communicate vital information to one's team almost instantly after acquiring it while being under heavy pressure on top of the mass amounts of stimuli provided from the game is exceptional for professional esports athletes. The actions per minute, such as the mechanical movement, auditory cues, and responding to them, making vocal call-outs while thinking about the next move, are unprecedented in any other sport than esports.

Since the act of playing video games competitively is information-dense, this thesis will use information processing theory from Miller's book to analyze what happens when people are playing video games in a competitive environment. The approach is based on the fact that people process the information they receive from external stimuli instead of reacting to it. This method helps us understand how people, especially children, break down information as they receive it.

However, it must be noted that without empirical data, it is not possible to draw conclusions about the inputs and outputs of the players in-game. Therefore, the aim of this study is to create a basis of understanding how these inputs and outputs work in terms of playing *Counter-Strike: Global Offensive*. Things that have an either positive or negative effect on communication and team dynamics are considered as well, since there are a lot of factors that affect communication.

## 2 Description of the research material

In this section I will define esports more specifically, underline the importance of communication in *Counter-Strike: Global Offensive* and specify the roles players have in-game to have a more holistic understanding of communication and teamplay.

### 2.1 Definition of Esports

The definition of esports has been under substantial discussion in recent years because many do not consider esports as sports due to a lack of individuals' physical activity. However, there is a difference in definitions of sports and Esports:

ESports is a form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of players and teams as well as the output of the eSports system are mediated by human-computer interfaces. In more practical terms, eSports commonly refer to competitive (pro and amateur) video gaming that is often coordinated by different leagues, ladders, and tournaments, and where players customarily belong to teams or other “sporting” organizations which are sponsored by various business organizations. (Hamari & Sjöblom. 2018, p. 1)

The sport side of esports is, of course, related to the fact that it is competitive, where players or teams go against each other in tournaments that are sponsored by more prominent organizations, just like in traditional sports. However, it needs to be considered that esports requires extensive coordination within the groups and being mentally sharp during high-stress situations. Tang (2016, p. 1) stated that “Esports also relies on teamwork that entails coordination, communication, and cohesion. Similarly, member attributes, motivation, and team processes are factors to be taken into consideration when discussing the characteristics of high-performing esports teams.” Professional esports teams have rigorous training routines, similar to the ones in traditional sports: “findings indicate that the average eSport player practices between 5.5 and up to 10 hours a day prior to competitions” (Difranco-Donoghue, Balentine, Schmidt, & Zwibel, 2019). Esports also has the characteristics of a sport: “according to Guttman’s (2004) and Suits’ (2007) characteristics that define an activity as sport, esports can be classed as a sport because



it includes play (i.e., voluntary, intrinsically motivated activity), the events are organized and governed by rules, includes competition with the outcome of a winner and a loser, and comprises skill” (Bányai, Griffiths, Király, & Demetrovics, 2019).

Esports require a lot from the players in terms of cognitive processes and physiological reactions, as mentioned in an article interviewing professor Ingo Froböse, who studied the physiological strains that esports athletes go through:

The amount of cortisol produced is about the same level as that of a race-car driver. This is combined with a high pulse, sometimes as high as 160 to 180 beats per minute, which is equivalent to what happens during a very fast run, almost a marathon. That's not to mention the motor skills involved. So in my opinion, eSports are just as demanding as most other types of sports, if not more demanding. (Schütz, 2016)

Therefore, it is safe to say that esports are physically, physiologically, and mentally challenging.

## **2.2 Communication in Counter-Strike Global Offensive**

When talking about digital video game design, “game mechanics” is usually used to describe what the game is about (Hanghøj & Nielsen, 2019). The term refers to what kind of a game it is or what the players can do. A game usually involves a core mechanic, which describes the game’s most important feature. In a game like *Counter-Strike Global Offensive* (CS:GO from now on), a First Person Shooter, one could argue that the core mechanic is to shoot, even though jumping, walking, and throwing are essential elements in the game as well.

However, these descriptions of the game are on a rudimentary level. “As the players become more skillful, these actions become less important and ‘communication’ becomes paramount.” (Hanghøj & Nielsen, 2019). When players progress from the beginner phase to the expert phase, the focus of the game

changes. At the beginning practicing to aim, move, and to use grenades efficiently are the most important things to master. However, as the players' skill levels progress, the game mechanics become less critical, and communication becomes essential. As Hanghøj and Nielsen mention in their paper, the core mechanic changes from shooting to communication, which is especially true at esports players' level.

“In football everyone on the pitch is able to see where the ball is at any. In CS:GO, each player can only see the world through the eyes of their avatar and therefore have very limited information.” (Hanghøj & Nielsen, 2019). The comparison between a football game and a CS:GO match is excellent since it gives us an understanding of why communication is the key element to succeed in CS:GO at a high level. CS:GO is played in a five versus five format, the terrorists and the counter-terrorists. The terrorists' objective is to plant the bomb at a site located as bombsite A or bombsite B in their radars. The counter-terrorists job is to defend both sites from the terrorists. If terrorists manage to plant the bomb, counter-terrorists are still able to defuse it. The winning team is the one who has eliminated all five players of the opposing team or have managed to detonate or defuse the bomb.

Since the players only have information available to them through their avatars, the communicational aspect becomes more relevant when playing strategically as a team. When a team communicates efficiently, they can create a holistic view of the game by getting information from five different avatars instead of only one.

### **2.3 Analyzing communications of esports professionals**

To understand how professional esports athletes use communication, I will analyze one round worth of communication and tactics used by the professional Counter-Strike Global Offensive team *Mousesports*. This game was broadcasted on social media platforms, such as Youtube and Twitch. The source I will use is “ESL Counter-Strike” from Youtube (<https://www.youtube.com/watch?v=mImyJRyLv8Q>).

The clip used for this study is of the last deciding round; if Mousesports win the round, they win the game; if they lose, the game will go in overtime. This game was a semi-final, so the stakes were high, and it can be heard and seen from the players playing. In this particular event, ESL Pro League Season 10, the winners' prize pool is 250,000 dollars.

For the analysis, it is beneficial to clarify the players and their roles within the team. As stated in their website: Chris, "ChrisJ" De Jong is one of the snipers in the team. He is a hybrid player, meaning that he plays both the rifleman position and the sniper position. Finn "Karrigan" Andersen is the team leader or the in-game leader. He coordinates the team and calls out the tactics which to execute each round. David "frozen" Čerňanský, like ChrisJ, is a hybrid player. Robin "ropz" Kool is the team's designated rifleman. He plays a support position from the backlines, assisting his team with smoke grenades, flashbangs, and staying in positions that are not common. Lastly, Özgür "woxic" Eker is the team's designated sniper. He plays the sniper role whenever it is possible. (MouseSports).

ChrisJ is also considered a lurker, which usually takes a different route than the rest of the team; this is to gather information more holistically from the entire map. Frozen is considered to be the entry fragger for the team. This means that he usually goes in first to the gunfights and tends to be an aggressive player in nature. These roles are not static; they might change during the game, depending on how each player performs. Usually, the in-game leader is the same and makes these changes in player roles, whether necessary.

CS:GO players in professional esports teams are usually designated to a specific role. This helps the team and the player since both know what they are expected to do. The player feels like they are part of a system; each part plays its role to thrive. In amateur games or when playing for fun from home, players usually do not have roles within the game, as CS:GO is played and considered to be a leisure activity, not to be taken that seriously. I have found that sometimes people tend to lean on one role of another, depending on what kind of people they are outside of the game. Some are quite vocal and like to lead, which transfers to the player wanting to be the in-game leader and lead the team. I have also noticed that

some people tend to be quieter and like to play solo. These players tend to lean towards the lurker role in-game, even though they have not made the conscious decision; it is just their part of their personality to play that way.

## **2.4 In-game jargon and information**

To have an understanding what is happening on the round that I analyze, some of the in-game jargon needs to be explained. Here I will shortly mention the most important things that are not necessarily understandable for everyone.

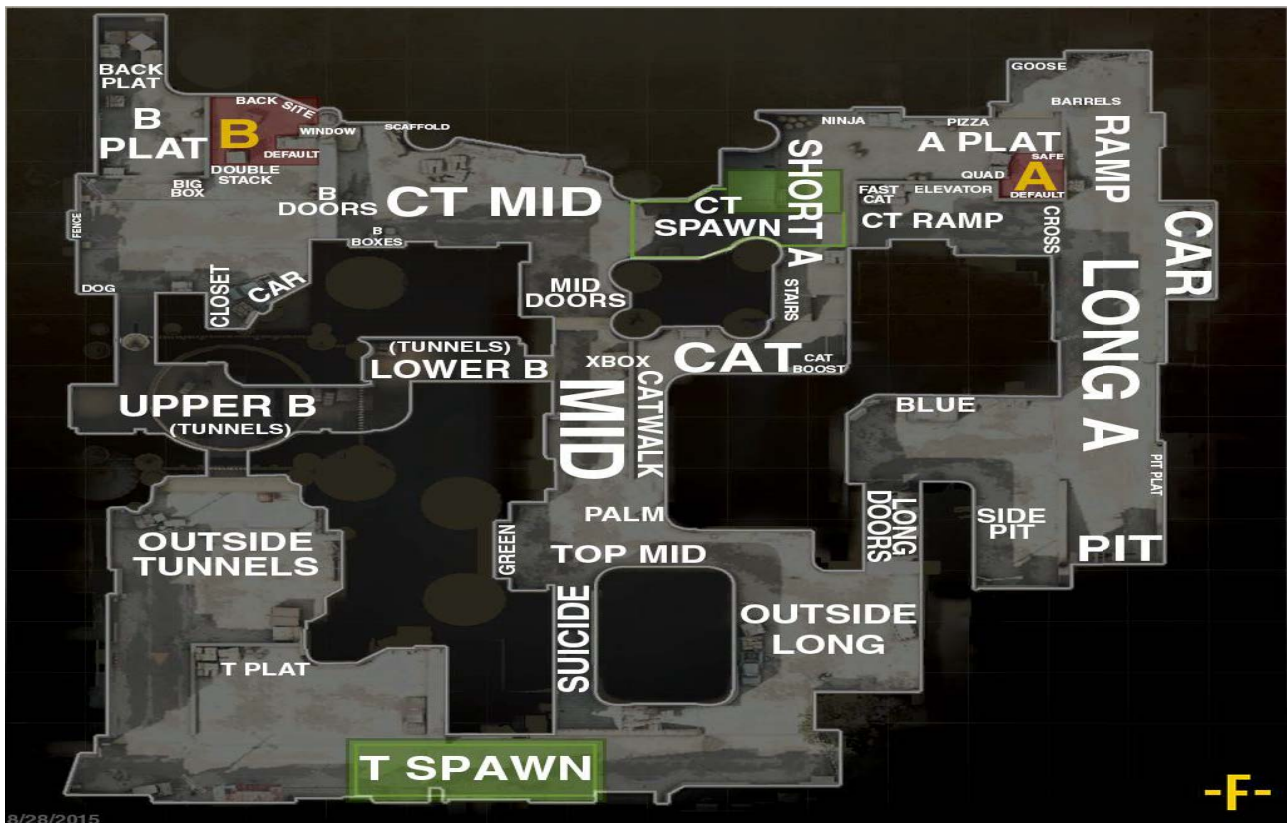
Killing and eliminating the enemy is straightforward and self-explanatory, but these things are constantly communicated within the team. That is why the analysis will have information, such as “I kill B”, meaning the player will go to the B-site to try to get an elimination there. Also, if an enemy player is wounded, the players tend to say that they are “low”, meaning they are low in hitpoints. That means that it does not take that many bullets to eliminate them.

About grenades; there are flashbangs, molotovs, high explosive fragmentation grenades or HE-grenades for short and smoke grenades. Flashbangs are meant to flash the enemy player for a short period of time, molotovs are mainly used to secure a certain area and make sure no one tries to go through it, he-grenades are meant to deal damage to the enemies and smoke grenades are meant to block the enemy’s vision when trying to get to a bombsite for example.

Then there are the technical terms, such as rushing, pushing, securing, holding, peeking and flanking. Rushing and pushing are self-explanatory, but they mean the forceful action to go on a certain area on the map. Securing means the action to clear any enemies from a certain location in the map, therefore securing it. The act of holding is holding a certain angle or site, to ensure that no one attempts to go through that area. This ensures that when terrorists are attacking for example, a player can make sure that

no one comes behind them by holding their rear. Peeking is the act of taking a peek of an angle, where enemies are expected to be. Peeking can be done alone and by coordination. Flanking is the act of attempting to go behind enemy lines to secure kills or a bomb plant for the team.

This section and picture is meant to assist understand the situation that is analyzed in section 4.1.



*The Map of De\_Dust2.*

Source: <https://steamcommunity.com/sharedfiles/filedetails/?l=finnish&id=157442340>

### **3 Theoretical and methodological framework**

Here I will explain what information processing theory is, why is it something that can be used in this study and I will also underline important factors that need to be considered when analyzing professional esports athletes communication, which are the stressors they face and the cognitive requirements of video games.

#### **3.1 Information Processing Theory**

Information processing theory addresses the question of how children deal with information in the modern technological world.

Information processing investigators study the flow of information through the cognitive system. This flow begins with some *input*, such as a written passage, a problem to be solved, or an event, into the human information-processing system. The flow ends with an *output*, which can be information stored in long-term memory, motor behavior, speech, or a decision. Mental operations occur between input and output during real-time. (Miller, 2016, p. 318–319)

This method applies to the event of playing video games in a competitive environment. The input(s) would be the computer screen, a task in-game, or a requirement to make a call for one's team. The output, in this case, would be moving one's mouse and using the keyboard at the same time (motor behavior), calling out a strategy, or making out informed calls about relevant information concerning the player and team.

For example, the information may be attended to, transformed into some mental representation, compared with information already in long-term memory, assigned meaning, and used to formulate a response. More generally, both humans and computers manipulate representations and transform input into output. (Miller, 2016, p. 319)

In information processing theory, the behavior of people is compared to computers. While this generalization is not valid in every aspect, the input and output system applies, especially in this scenario.

People process stimuli from the environment through their systems and create an appropriate output and are required for the situation.

Psychologists that study information theory are interested in the mental processes that children apply when dealing with information.

In other words, they are primarily interested in exactly how the processing system actually operates in real time in a particular situation – how the system changes external objects or events into a cognitively useful form, perhaps according to certain rules. (Miller, 2016, p. 320)

There are two styles of information processing in psychology: computational models, which are usually computer simulations of children’s thinking, and empirical studies, which deal with different aspects of information processing, i.e., attention, memory, and executive control cognitive processes (Miller, 2016, p. 320). In this thesis, my aim is to help understand the complex processes that are present through Miller’s Information Processing Theory. Since I do not have empirical data to draw my conclusions on, I can not conclude what kind of input and output processes are actually present while the players are making in-game decisions and callouts. However, even without this data, we can see from the gameplay and reactions of the players what kind of behaviors these callouts and reactions – inputs and outputs – result in-game.

### **3.2 Cognitive requirements of video games**

Many studies have been done on the effects video games have on people who play for a living. However, none talk about what is required to become a professional esports athlete. Thus, my information will rely on studies that examine what kind of benefits or harms video gaming has on the players. In an article written by Colzato, Wildenberg, & Hommel (2010) they mention the requirements First Person Shooter games briefly have: “[FPS games] require players to develop a flexible mindset to rapidly react to fast moving visual and auditory stimuli, and to switch back and forth between different subtasks.” Their study had a group of novice and expert players performing a task that tests their cognitive flexibility. Their findings were that players with an extensive video game background had better cognitive-control skills

and cognitive flexibility than the group that did not have much experience with games. The gamers were able to switch tasks faster than the ones that did not play games.

In another study done by Steenbergen et al. (2015), they mention in their article that first-person shooters are “associated with improvements in a wide range of perceptual, (visuo-)spatial, perceptuo-motor and attentional skills.” They continue:

For instance, AVG [action video game] experience has been found to be associated with a more efficient distribution of visuo-spatial attention, a general increase in central and peripheral visuospatial attention, an increment in the number of objects that can be apprehended, enhanced temporal processing of multisensory stimuli, enhanced sensorimotor learning, and a general speeding of perceptual reactions.

There are, however, adverse effects that have been studied as well (Hattenstone quoted in Tang, 2018):

The growth and opportunities in esports have also resulted in a series of issues, among which are addiction (which has always been a focus of research on gaming), player exploitation (which, given that many players are young, could cause serious damage), and corruption (which has sadly become common in the more established traditional sports industry).

Much of the research that involves video gaming and competitive video gaming has been done in a negative tone. It is worth mentioning because esports athletes suffer from physical and mental health issues due to prolonged periods of sitting and looking at the screen. Recreational players and esports athletes also experience escapism, a term used for escaping reality with video games' help. “...escapism is a complex mechanism that interacts with an individual's mental health (such as high stress, psychosocial wellbeing, low self-esteem)” (Bányai et al., 2019).

In the review article “The Psychology of Esports: A Systematic Literature Review” (Bányai, Griffiths, Király, & Demetrovics, 2018) players' motivations to become esports athletes were studied. The study found that the aspects of becoming a successful esports athlete are:

Esport players need to (i) have great knowledge about the video game, (ii) think strategically and make fast and smart decisions, (iii) be motivated to keep moving forward (i.e., not think about the past



performances), (iv) be able to separate daily life from performance, (v) avoid being distracted and stay focused, (vi) cope adaptively with the harassment, (vii) maintain a growth mindset (i.e., positive attitude), and (viii) warm up before performance either physically and/or mentally.

On top of these characteristics, the players must maintain a mindset that helps them develop in-game. Esports athletes also face difficulties in their professional gaming path, such as “confidence issues, inadequate coping strategies with anxiety, past achievements and mistakes, harassment, lack of self- and team development (e.g., knowledge about the game, team dynamics, team communication, individual skills), and difficulty in separating life and gaming.” (Bányai et al., 2018.) These aspects must be considered when trying to create a holistic view of the esports athletes and the kind of pressure they might be under when playing in a competitive environment. In the next chapter I will discuss the stressors of esports and the effects that they might have on the players and their communicational abilities.

### **3.3 Stressors of esports and their effects on communication**

Playing in a tournament with much money involved and a broad audience is a tremendous stressor to anyone. We have covered that playing in a competitive environment demands a lot from the players in the article written by Schütz (2016). How do these stress factors affect the gameplay of these athletes? A recent study was done by the University of Chichester studying psychological pressure among esports players. “Researchers found that esports players faced 51 different stress factors – including communication problems and concerns with competing in front of live audiences – mirroring the mental conditions experienced by pro athletes including footballers and rugby stars in high-profile tournaments“ (2019). Esports players and pro athletes of other sports experience the same kind of psychological strain. However, when playing CS:GO competitively, like discussed before, communication needs to be top-notch for teams to perform at the highest level.

Poor communication between teammates was identified as a key stressor among players when exposed to pressured environments. To manage the situation, said the research team, players either became overly aggressive to one-another or attempted to avoid communication altogether, which negatively impacted their performance. (University of Chichester, 2019).

Psychological strain and stress affect team performance directly, which lowers their chances of communicating well, reducing their chances of winning. It is a common practice among professional esports players to see a sport psychologist or a therapist due to the strain they have to perform under. Many teams have designated coaches that specialize in keeping the team physically and mentally fit.

It is worth noting that esports athletes can suffer from severe physical injuries as well. According to Diffrancisco-Donoghue et al. (2019), the most common injuries that esports athletes have are wrist and hand injuries. These findings are arguably easy to understand since esports athletes sit for prolonged periods while simultaneously making up to 500-600 actions per minute – compared to novice gamers that execute approximately 50 actions per minute. Many esports athletes do not actively move or do any other sporting activities. Usually, games are played in an improper posture in a dim room with an excessively bright screen, causing eye fatigue and headaches (Diffrancisco-Donoghue et al. 2019). These are all considered factors when discussing professional video gaming and esports athletes, as there is not much information or studies on esports athlete's health care.

In an article written by Smith, Birch, & Bright (2019), they discovered that team dynamics affect in-game performance and overall respect for one another within the team. Esports athletes faced internal and external stressors, which varied from communication issues, criticism from the in-game leader, lack of confidence in teammates, intra-team criticism, life balance, and esports athletes faced scrutiny criticism from opposing teams and the social media (Smith et al., 2019). These are all factors that affect the esports athlete's performance on top of its effects on the athlete's mental health.

This chapter showed that the stressors that esports athletes face are immense and are therefore something to consider when analyzing their communication.

## **4 Analysis – Presentation of the analysis and findings**

In this analysis, I will be taking a look at one round worth of communication in the game Mousesports versus Astralis in the ESL Cologne Season 10 semi-finals. This analysis will give us a concrete base to work on, as the game is a real-life scenario of professional esports athletes playing seriously against each other. I will focus on how communication is formed within the team, what kind of call-outs are used, and analyze it based on my own experience in esports. Does fluent communication affect Mousesports winning the round and the game altogether?

I will analyze the main points between the players' communication. I will not attempt to decipher the whole video into text, but I will pick the essential parts. Therefore, any pauses, sighs, shouts, et cetera will not be considered, only the game's relevant communicational aspects.

### **4.1 Analysis of a round – Mousesports versus Astralis**

The round starts with the team being audibly excited for the round. The team excites themselves up. It is worth mentioning that every round is a reset; terrorists end up in their base and counter-terrorists in theirs. It is also worth noting that the spawns differ each round. Some players might have a shorter route to a specific site than others. In this case, Woxic calls out: "Go kill long, I kill B." Woxic got a good B-site spawn, meaning he ran close to the B-site to look for an elimination. Woxic gave out the call to his teammate Frozen because he had the best spawn for "long." This is a significant advantage for Mousesports because the terrorists see the counter-terrorists first in the long area if they have a good spawn for it. This leads to Frozen getting a sniper kill in A-long. ChrisJ said that he would "kill mid" initially, calling out that he will try to get an elimination in the middle of the map, where there is a double-door, which can be peeked from both counter-terrorists and terrorists. This "mid" position is also a valuable call-out since the mid player can see how many people cross from the double-doors to B-site. In-turn, this call-out can give information to Woxic, who is trying to get an elimination in B. Woxic calls-out to hold for "lower" to ChrisJ, which is the lower tunnels in the map that can be accessed through the double-doors. The lower tunnel is situated next to Woxic, and that is why he made the call. Therefore,

he can focus on the other entrance to B-site, which eliminates the fact that he does not need to worry about the lower tunnels.

After Frozen got the elimination from long, Karrigan, the in-game leader, made the call to “just chill.” This is because players might get overly excited after turning the game in their favor. This might lead to overconfident plays that might not be smart. Karrigan made the right call, he wants everyone to keep their composure while playing, so they can start to plan their next strategy with the game in their favor. Simultaneously Karrigan made the call that the enemy threw a Molotov in B-tunnels, indicating that there is at least one player in B-site. Karrigan continued by saying, “they could go lower [tunnels] now,” meaning that the middle double-doors that ChrisJ is holding are smoke. This means that any members from Astralis can sneak through the smoke in double-doors and enter lower tunnels. Karrigan immediately went to lower tunnels to hold anyone attempting to push.

After this, Karrigan called out for an x-box smoke. This box is located behind the double-doors, and smoking gives the terrorists a chance to cross the “catwalk” route to A-site. Catwalk is also called “Short-A.” Long is also called “Long-A,” which indicates a longer route to A-site than the Short-A route. ChrisJ responded that he would smoke the x-box and called out exactly when he threw the smoke. This lead Karrigan to make the call to make the A-split push. “We are gonna split A, ok? Me, Chris, Woxic short”. This was lead by ChrisJ saying, “Let me go long with David.” ChrisJ was holding on to the bomb and gave it to Ropz. After that, he made the call to Ropz to go slowly to A-short and afterward to A-site. Karrigan and Woxic made the call to flash the middle and proceeded to do so. This is to give them a chance to cross the double-doors to the x-box, from which they can enter A-short. One of Astralis’ players watched the double-doors with a sniper from the counter-terrorists side of the middle, and without a flashbang, one of them would have gotten picked off in that instance. After this, ChrisJ and Frozen start to head towards A-long. ChrisJ makes the call: “I think you should go first since you are the long-player.” This call was made because Frozen made the first elimination at the beginning of the game in long. The enemy team expects Frozen to be somewhere around the long area since he made the first peek there. ChrisJ, however, has not been seen by anyone from the Astralis’ team. He also continued with “..in case he kills you”. If ChrisJ was the first to go long and someone eliminated him, the enemy would have probably expected to Frozen come right behind him. Making Frozen go first in this instance is the right

call since Astralis does not know whether anyone could push after Frozen. At the same time at A-short, Karrigan made the call that no one is short and followed it by “let us take short here.” Astralis had a player holding short from further back with the help of his teammate’s flashbang, he managed to eliminate Karrigan. However, Woxic was right behind him, securing the elimination of the Astralis player after that. This situation gave the team the information that there is at least one player on A-site. Karrigan made the call to Ropz to go long instead of A-short. This is because the Astralis player saw at least 2–3 people A-short.

The situation right now is 4v3 in favor of Mousesports. Mousesports have the information that there is at least one player on A-site. Woxic made the call: “they are blocking short,” and Karrigan followed it up by telling Frozen and ChrisJ to push A-long. This push resulted in Frozen getting an elimination in A-long. Now Mousesports is a step closer to getting to the A-site. Karrigan told Woxic, who is in A-short alone at this moment, to “just survive.” Woxic stayed in A-short and held for any pushes from lower tunnels and the middle double-doors. ChrisJ asked Ropz for a smoke grenade, to which he replied that he does not have one – Frozen immediately said that he has one. ChrisJ asked frozen to smoke the counter-terrorist base or the “CT.” A small gap can be seen from middle double-doors and CT-base that snipers usually hold for anyone crossing to A-site. The situation as of right now is 4v2 in favor of Mousesports. Three of the Mousesports players are in A-long, and one is holding passively in A-short. Ropz threw in the CT smoke, and the players started progressing towards the site.

After Ropz managed to smoke counter-terrorist base, one of the Astralis’ players pushed middle double-doors. Woxic was holding it and managed to get an elimination and confirmed it to his team. Karrigan said: “just calm boys, 30 seconds”, which means that there are 30 seconds left for the round. Karrigan made this call before to ensure that no one gets overly excited before the round is won. After this, flashbangs were thrown from A-long to the counter-terrorist base, where the last Astralis’ player was located. Woxic dropped down from A-short and pushed middle double-doors, and he managed to get the last elimination, which meant that Mousesports won the round and the game as well.

## 4.2 Input and output of the players

As Miller points out, information processing investigators study the flow of information (2016, p. 318). As mentioned before, this flow of information starts with an *input* and ends with an *output*. There are mental operations that occur between inputs and outputs: “for example, the information may be attended to, transformed into some type of mental representation, compared with information already in long-term memory, assigned meaning, and used to formulate a response” (Miller, 2016, p. 319). In this thesis, it is apparent that these complex cognitive patterns are visibly present. The players make constant call-outs, assumptions of where the enemies might be, microactions with their peripherals while having a sharp focus on what is happening in front of their screen. Even without empirical data, the inputs the players are introduced with are: (1) visual information from the screen, (2) auditory information from their headsets and possibly from the audience, (3) the physical information from their bodies: possibly an elevated heartrate, sweat and increased stress levels. The outputs, then, are: (1) reacting to visual stimuli, processing the information and making a decision, (2) adjusting movements according to the decision that is made by moving the mouse and using the keyboard to either move, use some sort of utility or (3) making call-outs. Using the information that was first introduced by the visual stimuli, processing it and making an informed call-out and trying to make it as compact and information-dense as possible. This can be seen in the analysis, the players tend to make extremely short call-outs, such as “I kill B”, or “Push short”. With this information at hand, these are the input and output systems that can be deducted from the data collected.

An excellent example of what happens between inputs and outputs is explained well by McLeod (2008):

For example, the eye receives visual information [input] and codes information into electric neural activity which is fed back to the brain where it is “stored” and “coded”. This information can be used by other parts of the brain relating to mental activities such as memory, perception and attention. The output (i.e. behavior) might be, for example, to read what you can see on a printed page.

Esports athletes rely on the information in their long-term and short-term memory while playing; for example, hundreds of smoke-grenade line-ups that most professional esports athletes have practiced and therefore stored in their long-term memory. Perception and attention might vary, but I would argue that

most of the attention is focused on the game itself, but I can not make claims since there is no data to back the information.

In this game, the players' inputs vary from making call-outs, using motor movements to move their mice, and using the keyboard to move around and visual attention to the screen. These inputs happen nearly simultaneously, and I would argue that at least the motor movements are subconscious. The only action that is not subconscious and needs conscious effort is communication. It can be seen and heard from the game that communication is a critical element of an esports team. The round that I analyzed was 1:30 minutes long, and it was full of communication from the beginning to the end.

### **4.3 Results**

In this thesis I proved that there are complex cognitive patterns that the professional esports athletes go through while playing the game. Especially communication, it is short, information-dense and nearly instantaneous. Taking into consideration the fast pace of the game and the visual and auditory stimuli, which can be seen and heard from the round – the ability to perform under such circumstances is not a simple task. Without communication, the game would be entirely different. The players would have to take more risks because they would have to rely on their assumptions and guesses about the enemy's whereabouts and the utility they currently have. It would be comparable to putting a blindfold onto one's eyes. Without communication, the Mousesports team would not know when to execute a strategy, what to watch out for, what kind of utility the enemy has used around the map, what the next steps are that they should start preparing for, and what to do. In general, they would not have the synchronicity that communication enables them to have.

It would be good to conduct a study where esports athletes' models of thinking are studied through interviews or other extracting data from the players. With the information at hand, only a fraction of communication and thought processes can be studied.

This thesis aimed to study how relevant communication is for esports athletes. It can be said that esports athletes need good communication with one another to succeed at the highest level. This study also

brought attention to the fact that studies done about this topic are scarce. That is why my personal experience in esports and my knowledge in competitive video games are considered in this study. There are plenty of studies that need to be made in this field, such as considering the physical and mental health of esports athletes and how to create healthy environments to play in for future esports athletes. Esports is not a trend that will pass; on the contrary, it is a growing phenomenon (“The Incredible Growth of eSports”) that needs to be studied more critically now than ever. Many studies tend to focus on the negative aspects of esports and how it can cause addictive behaviors (Choi, Hums, & Bum, 2018), lack of physical activity (DiFrancisco-Donoghue, Werner, Douris, & Zwibel, 2020) and generally esports is often viewed as a conflicting topic. We need more constructive studies and talk around esports so that the negative impacts can be minimized. Esports athletes suffer from social stigma due to many not understanding the world of esports, which can be affected by research on the topic. Therefore, it is essential to conduct studies about esports and esports athletes, especially the social side of gaming, and how it can affect communication abilities. Hanghøj & Nielsen declared in their study that “esports skills are people skills” (2019), and this holds. Esports athletes cannot compete at the highest level without confronting other people and working with them in a stressful environment.

The physical and cognitive strains that esports inflicts on the athletes have been studied and are a topic of concern. More studies of the psychological side of esports, such as how communication can develop in communication-intense games, such as *Counter-Strike: Global Offensive* or *League of Legends*, should be studied as there are no studies done on that subject as of yet.




This thesis studied how communication is a prominent factor in a competitive eSport environment. Esports, as a concept, was studied and explained why esports could be considered as a sporting activity in its own right. On top of that, justifications for why esports athletes can be considered as real athletes were given. Competitive video gaming can be considered as being very taxing to the body, not to mention the stress factors that esports athletes face are immense. However, gaming for prolonged periods daily can result in physical trauma to the athletes, such as wrist pain, eye fatigue, and a slouched posture. These need to be considered by the esports athletes coaches and organizations responsible for the athletes' health care.

Communication is an essential aspect for professional esports athlete teams that participate in a team-based game, such as *Counter-Strike: Global Offensive*. Without extensive and fluid communication within the team, as proved in this thesis, the team's results would be sub-par at best. Even though mechanical skills, such as aiming and learning smoke grenade line-ups within the different maps in-game, are important mechanics for every esports athlete, communication is still essential in winning games as a team. This thesis aimed to show through an actual event where in-game communication could be heard that communication is indeed an essential tool for esports teams, especially in CS:GO.

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