



BSc Motorsport Management

Formula One Race Entertainment – A Study of Viewer
Behaviours and Satisfaction

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Appendix 1: DECLARATION

I, Luke Atherton, declare that I am the sole author of this dissertation; that all references cited have been consulted; that I have conducted all work of which this is a record, and that the finished work lies within the prescribed word limits.

This has not previously been accepted as part of any other degree submission.

Date: 16/05/2018

Appendix 2: FORM OF CONSENT

I, Luke Atherton, hereby consent that my dissertation, submitted in candidature for the BSc (Hons) Motorsport Management degree, if successful, may be made available for inter-library loan or photocopying (subject to the law of copyright) and that the title and abstract may be made available to outside organisations.

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Abstract

This dissertation investigated the current perceptions of Formula One fans, identifying fan viewing behaviours and elements of a Formula One race which fans wish to see modified to enhance viewer entertainment. The influence of technological innovations, regulatory changes and the opinions of various stakeholders are discussed in detail throughout the study, and a notable gap in the research regarding viewing behaviours when watching a Formula One race was identified. The first objective was to identify which elements of a Formula One race fans wish to see modified to enhance viewing entertainment. The second objective was to identify the viewing behaviours of people who watch Formula One to bridge the apparent gap surrounding the discussed topic area, and provide a foundation for further research purposes.

In order to investigate the objectives, a questionnaire was created and distributed April 2018 at Castle Combe circuit, a popular motorsport circuit located in the Chippenham, South West of England. By conducting statistical analysis on the primary data gathered and interpreting the results, a large discrepancy between the opinions of males and females was identified, which indicated that the majority of females asked were in favour of modifying current aspects of a Grand Prix race to enhance viewing entertainment.

Overall it was, however, determined that the null hypothesis was to be accepted;

H₀ – Formula One fans are not in favour of modifying current aspects of a Grand Prix race to enhance viewing entertainment.

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1. Introduction

The inaugural Formula One World Championship race took place at Silverstone, England 13th May 1950 as documented by Noble and Hughes (2003). Formula One has since undergone considerable change throughout its 68 year history, much of which has divided the opinions of those who share an affiliation with the sport. Today Formula One is owned by Liberty Media Corporation, who purchased the commercial rights for Formula One in September 2016, in a deal estimated to be worth £6 billion (Sky News, 2016). According to Benson (2018) the takeover was initially greeted with 'guarded enthusiasm' though the widespread consensus was that a change of hierarchy was much needed. Liberty Media Corporation recently presented their 'five-point plan' highlighting the future vision for Formula One, with Cooper (2018) suggesting that; *'Liberty intends to make the cars more raceable and improve overtaking, while putting the focus back on the driver'*. The ambition, according to Cooper (2018), is to produce a fan focused and commercially viable model, with increased financial benefit for teams and with *'technological innovation at its heart'*. To support this, current Formula One CEO Chase Carey quoted in a recent statement;

'Formula 1 is a sport with a rich history. We want to preserve, protect and enhance that history by unleashing F1's potential, by putting our fans at the heart of a more competitive and more exciting sport'. (Cooper, 2018)

The Federation Internationale de l'automobile (FIA), governing body for Formula One, recently released details of key regulatory changes for 2019 designed to encourage on track battles between drivers and increase overtaking opportunities (Metah and Shah, 2018). The changes aim to simplify the aerodynamics of Formula Cars, which currently create a turbulent wake of such magnitude that cars are unable to follow each other closely, thus hampering overtaking opportunities and 'wheel to wheel' racing. In further relation to the proposed changes, Metah and Shah (2018) state; *'While there are no guarantees that these rule changes would improve overtaking, the changes are definitely trying to eliminate the current impediments that do prevent overtaking'*.(Metah and Shah, 2018).

1.1 Aim of the study

This dissertation will focus upon and investigate the current perceptions of Formula One fans, with the aim of identifying fan viewing behaviours and elements of a Formula One race which fans wish to see modified to enhance viewer entertainment. Many of the sources cited in chapter two, the review of literature, have raised the issue of conflicting interests relating to technological innovation, regulatory changes and improving safety versus spectator entertainment. Whilst technological innovations, regulatory changes and the various opinions of stakeholders have been discussed in detail throughout this study, a notable gap in the research regarding fan behaviours when viewing a Formula One race has been highlighted. The findings from this academic study aim to bridge the apparent gap surrounding the discussed topic area, of which can then be used for further research purposes.

The motivation behind the study originates from comments made by current Formula One World Championship driver Lewis Hamilton, who when interviewed by ITV chat show host Jonathan Ross in September 2017 confessed that if watching Formula One he would 'watch the start of the race, go to sleep, and wake up to catch the final few laps' (The Jonathan Ross Show, 2017). With this revelation in mind, attention was drawn to the current perception of Formula One fans regarding 'entertainment value' and subsequent fan viewing behaviours. The resulting outcome was the formulation of the following hypothesis which are to be tested;

H₀ – Formula One fans are not in favour of modifying current aspects of a Grand Prix race to enhance viewing entertainment.

H₁ – Formula One fans are in favour of modifying current aspects of a Grand Prix race to enhance viewing entertainment.

1.2 Methodology

In order to investigate the proposed research question and formulated hypotheses, a questionnaire was created and distributed on the 7th of April 2018 at Castle Combe, a popular motorsport circuit located in the Chippenham, South West of England. The Spring Performance Car Action Day 2018 event was attended with the intention of gathering primary data as quickly and efficiently as possible by targeting a demographic of performance car and motorsport enthusiasts. Prior to the event permission for data gathering was obtained, in line with ethical protocol.

1.3 Dissertation Overview

Chapter Two – Review of Literature

This chapter contains a comprehensive review of previously published literature surrounding the topic area, consisting of opinions relating to the history and evolution of Formula one, technological innovations, regulatory changes and spectator entertainment from various stakeholders.

Chapter Three – Methodology

Chapter three considers the chosen methodology behind the study, identifying the appropriate philosophy and research paradigm selected to underpin the study and the resulting methods used for conducting the research.

Chapter Four – Analysis and Results

The primary data gathered from the questionnaire is presented and analysed using statistical test procedures to determine if formulated hypotheses can be accepted or rejected.

Chapter Five – Conclusion

Chapter five contemplates the overall findings from the study to conclude whether the objectives of the research were achieved, providing answers to the proposed research question and subsequent hypotheses. Limitations of the study and recommendations for future research are also recognised and discussed in this chapter.

2. Review of Literature

2.1 History and Evolution of Formula One

Formula One owes its existence to the origins of motorsport dating back to the late 19th century, with the first organised motorsport competition taking place in France on July 22nd, 1894 (Gifford, 2006). The competition was organised by Pierre Giffard, the chief editor of French newspaper Le Petit Journal, and was titled 'Le Petit Journal Competition for Horseless Carriages', consisting of both steam and internal combustion engine powered vehicles (Andrews, 2014). According to Rendall and Mansell (1993, p.12); *'First prize would go to the vehicle which, in the opinion of the judges, covered the 80 miles from Paris to Rouen without danger, and was easy to handle, and in addition was cheap to run'*. Interestingly, the rules for the race further specified that speed would not be a criterion for the event, although Rendall and Mansell, (1993, p.12) argue *'everybody wanted to know who was the fastest'*.

A total of 102 competitors registered for the race, including distinguished vehicle manufacturers such as Panhard & Levassor, de-Dion Bouton and Peugeot, with each competitor paying a ten franc entry fee with the potential of being awarded the five thousand franc prize money on offer (Andrews, 2014). Out of the 102 entrants only 26 were present for the initial qualifying heats, with 21 partaking in the main event after the qualifying heat eliminations. 17 drivers would successfully complete the entire race, and were cheered on by a crowd of increasingly enthusiastic spectators (Andrews, 2014). Jules-Albert de Dion would be first to cross the finishing line, registering a time of 6 hours 48 minutes, and with an average speed of just 12mph (Andrews, 2014). The event would prove to be the catalyst for motor racing, and it is suggested by Rybacki et al., (1995, p.76) that; *'The rapid evolution of the motor car from fragile curiosity to robust, reliable replacement for the horse was driven by a curious and powerful merger of sporting ideals, natural human competitiveness and technical ingenuity'*. Braham (2008) would refer to human competitiveness as a basic natural instinct of man ingrained from the concept of survival, citing Darwin's theory of evolution.

The Automobile Club de France (ACF) was founded the following year in 1895, along with the 732 mile Paris-Bordeaux-Paris Race (Andrews, 2014), where the fastest car would be crowned the overall race winner (Rendall and Mansell, 1993). The race captured global interest, and in the same year the 54 mile Chicago-Waukegan-Chicago race would also take place, the first ever motor race in America (Andrews, 2014). Rendall and Mansell, (1993) propose that it was around this time the spectacle of motor racing was born. The era of 'city to city' racing had now well and truly begun across mainland Europe, although as described in an article by RACER Magazine (2012, p.58) it was fast becoming a '*gruesome freakshow*', relating to the major safety concerns of the public, spectators and competitors. As a resulting consequence the French government banned racing on public roads in 1901, however by now the Automobile Club de France had become a very wealthy and powerful organisation, and as suggested by Nye (2017), '*it knew which strings to pull to have the ban lifted, when necessary*'. Unsurprisingly, in January 1902, the ACF proposed plans for a Paris-Vienna race, albeit this would involve the use of public roads for motor racing purposes across three different countries (Nye, 2017). The Austrian government agreed to the race, whilst the Swiss government negotiated terms that would only allow competitors to 'pass through', strongly prohibiting any racing (Nye, 2017).

In the early 20th century Great Britain led the way for eradicating the ever increasing dangers of motor racing on its public roads, which at the time carried a 20mph speed limit (RACER Magazine, 2012). It was the vision of British entrepreneur and motoring pioneer Hugh F. Locke King, who planned to construct a closed motor racing circuit in Surrey, England, and according to RACER Magazine (2012, p.58); '*thereby saving it from its almost inevitable demise as a legal pursuit*'. The resulting outcome was Brooklands, the first custom built, motor racing circuit in the world, which opened in 1907 (Boutle, 2012). According to (Brooklands Museum, 2018); '*Brooklands race track was the 'Ascot of Motorsport' in its heyday. The outer circuit was 2 ¾ mile long, 100ft wide, with two long straights joined by two sections of banked curve up to 30ft high*'. It is suggested that the unique circuit design was an attempt to ensure safety at high speeds, as well as providing an exciting racing spectacle for the scores of spectators in attendance (Brooklands Museum, 2018). According to Baker (1989) Brooklands could host approximately 280,000 spectators.

The first ever motor race to carry the label of 'Grand Prix' would later take place in June 1906, organised by the Automobile Club de France (ACF) (Llurba, 2016). Located in Le Mans, France, the circuit which would use public roads had a combined length of 65 miles and a total of 32 competitors with 12 representing vehicle manufacturers (Llurba, 2016). The Le Mans Grand Prix would prove the catalyst for the construction of purpose built motor racing circuits and Grand Prix racing over the next couple of decades, with the infamous Autodromo Nazionale Monza, Italy, opening in 1922 (Llurba, 2016). It is further suggested by Llurba (2016) that; *'Italy became the second country, after France, to host a race using the name 'Grand Prix' at Monza. The name quickly spread to Belgium and Spain in 1924, and later spread to other countries. However, it was not a formal championship, but a variety of races that were held under different rules'*. By the 1940s numerous Grands Prix were taking place across Europe after the governing body 'Association Internationale des Automobile Clubs Reconnus' (AIACR) created the European Championship in the early 1930s (Noble and Hughes, 2003). The AIACR would later specify a small number of 'Premier' Grands Prix which would then be selected as major races as part of a World Championship, and would introduce a points system for determining a world champion along with standardisation of rules. This consequently led to the birth of Formula One, with the first official Formula One World Championship race taking place at Silverstone 13th May 1950 (Noble and Hughes, 2003).

Today Formula One is governed by the sporting body 'Federation Internationale de l'automobile' (FIA) (Noble and Hughes, 2003), a non-profit corporation accountable for 245 national motoring and sporting organisations, across 143 countries and five continents (FIA, 2018). Originally established in 1904 as the AIACR, the organisation was permanently renamed shortly after the Second World War in 1947 (Llurba, 2016). The FIA are responsible for imposing stringent legislation on Formula One racing to ensure the highest level of safety (Noble and Hughes, 2003), and since the deaths of Roland Ratzenberger and Ayrton Senna at San Marino Grand Prix, Imola, in 1994, there would be no fatal accidents until the death of Jules Bianchi in 2015 (Brawn and Parr, 2016). The FIA enforce strict sporting and technical regulations which must be adhered to by all teams and competitors. The FIA do not however

have any influence on the commercial aspects of Formula One, which is protected by European Law (Noble and Hughes, 2003). It is further suggested by Noble and Hughes (2003, p.45) that; *'the FIA has provided the rule book. It can – and frequently does – act independently of the teams in changing this book to serve what it judges to be in the sport's best interests'*.

2.2 1970s 'modern era'

The 1970s is often referred to as the beginning of the 'modern era' in Formula One, with the significant introduction of aerodynamically designed cars which would generate considerable down force, thus leading to significantly increased cornering speeds (Brawn and Parr, 2016). Arguably the most iconic and influential developments in the history of Formula One, Brawn and Parr (2016, p.15) characterised aerodynamically designed Formula One cars as; *'upside-down jet fighters, with the downforce pushing the car into the ground through the tyres and increasing grip – hence the reason the high levels of cornering, braking and acceleration performance'*. Joseph (2015) would however argue that whilst this may have resulted in a substantial improvement in overall lap times, top end speeds would essentially be reduced. Agathangelou et al., (1998) suggested that significant competitive advantages could be gained from aerodynamics in comparison to other key areas such as tyres, which were supplied by designated manufacturers, and engines which are often acquired from outside suppliers. Concerns were raised in the early 1980s due to safety over the increasing cornering speeds, which resulted in the FIA introducing regulations for 'flat bottomed' cars, which would take effect from 1983 (Collantine, 2009). Despite this intervention, Brawn and Parr (2016) would argue that aerodynamicists continued to discover ways of recovering down force from ground effect.

2.3 Aerodynamic Influence

The opinion of Noble and Hughes (2003) was that Formula One was suffering from a significant lack of 'wheel-to-wheel' racing, citing the unprecedented speed of the modern Formula One car, and car designers that were *'too clever for the sport's own good'* to blame. Noble and Hughes (2003, p.22) further state; *'Huge aerodynamic*

downforce and super-efficient carbon-fibre brakes mean that braking distances are incredibly short, which limits passing opportunities'. This theory is further supported by Butler (2005) who states; *'Formula One has undeniably lost some of its thrill in recent years. The lack of overtaking has led to accusations that races are becoming a boring procession'*. Butler (2005) further relates that the issue does not only lie with driver dominance, and hence less competition, but rather the optimisation of Formula One car aerodynamics. Interestingly, it is the view point of former Formula One aerodynamicist Phil Tiller that; *'It's quite fair for an aerodynamicist to design the car to have a very turbulent wake, knowing that other cars behind will not be able to overtake. It means that the team doing this will probably win, but it won't make good TV'* (Butler, 2005). This was further reiterated by The 2005 Constructors Championship winning team Renault, who stipulated; *'You try to design a car that handles as well as possible in turbulent air and produces as much turbulent air as possible at the back'* (Butler, 2005). This supports the argument of Gian Paolo, owner of Dallara Motorsports who suggests that; *'All the teams want to do is win races, they just don't care about entertaining the crowds'*. (Aylett et., 2007, p.139).

In 2009 regulatory changes would be introduced in an attempt to reduce the aerodynamic effects from the heavily contested 'double diffuser' design that was being used by Brawn, Williams and Toyota, aiming to cut downforce by around 50%, thus theoretically creating more overtaking opportunities (Evans, 2009). Article 3 of the 2009 FIA Formula One technical regulations outlines the intentions of minimising the 'detrimental' effect of turbulence following in the wake of another Formula One car, further specifying the requirements in section 3.15 Aerodynamic Influence (F1 Technical Regulations, 2008). The regulation changes would lead to the design of a *'smaller diffuser in a more rearward position'*, and would leave car designers searching for further ways to regain the loss of downforce (Evans, 2009). It was hoped that this would make Formula One cars less sensitive to turbulence or 'dirty air' when following closely behind other competitors (Brawn and Parr, 2016). Eventually the double diffuser design would be banned altogether by the FIA for the 2011 season (Autoweek, 2011).

2.4 Regulation Changes

The 2010 season would also see further major changes in the sporting and technical regulations, with the FIA introducing a ban on mid race re-fuelling, previously introduced in 1994, consequently limiting team pit stop strategy (Errity, 2015). Roy (2010) raised concerns regarding the ban, questioning the effect this would have on Formula One racing as an entertainment, and further stipulated; *'F1 isn't F1 anymore and has not been for a very long time'*. Errity (2015) stated that refuelling was banned on the grounds of safety and increasing pressure to reduce costs in Formula One, citing potential pit lane fire hazards and transportation costs of refuelling equipment and requirement of specialist team personnel.

In 2011, further regulations regarding aerodynamics would be brought in, with the introduction of Drag Reduction Technology (DRS), an adjustable rear wing which would be solely controlled by drivers, with the aim of increasing overtaking (Auto week, 2011). The concept behind DRS was the opening of a flap on the rear wing of the car which would create a 50 millimeter gap, reducing drag by approximately 15-18% and thus temporarily boosting speed (Simanaitis, 2012). The flap would return to its original position when braking is applied or manually requested, and could only be used on designated straights outlined by the FIA. The driver must also be within one second of the car in front to activate this feature (Simanaitis, 2012). Evidently this would have a significant effect on overtaking, with a record breaking 1,152 overtakes witnessed throughout the duration of the 2011 season (Clip The Apex, 2018). However, despite these figures, former Formula One driver Jacques Villeneuve proclaimed; *'What would be amazing is getting rid of DRS so drivers don't wait for the straight line to overtake and create proper racing'* (Gray, 2017).

The FIA would announce a radical set of technical regulation changes for the 2017 season (Brawn and Parr, 2016). The regulations would specify wider Pirelli tyres designed to suffer less tyre degradation, and therefore requiring less pit stops, along with wider wings aimed to increase downforce and mechanical grip (Scarborough, 2016). This is a surprising contrast to the technical regulations enforced previously in 2009 aimed at reducing downforce for increasing overtaking, and whilst it was predicted that the changes would cut lap times by around 3 seconds, Galloway and

Morlidge (2017) raised concerns suggesting that the changes could significantly impact overtaking opportunities. The opinion of Scarborough (2016) would further support this argument, stating; *'These changes have been largely aimed at making the cars faster, mainly from increased corner speed rather than top speeds. However, the stated intentions do not include improving overtaking, and many of these changes reverse the work done by the Overtaking Working Group back in 2009.'*

2.5 Impact of Regulation Changes

It is suggested by Mastromarco et al., (2009) that one of the defining characteristics of Formula One is the frequency of regulation changes enacted by the FIA, with an average of nine regulation changes taking place per season since the mid 1990s. The resulting regulation changes often impact the performance of teams and competitors, generally leading to improved competition and a more level playing field, as the relative advantage held by stronger teams is often restricted (Mastromarco et al., 2009). The teams do have a chance to contest and potentially overturn the regulation changes, although these attempts are often futile (Mastromarco et al., 2009). In 2010, former Formula One driver David Coulthard raised concerns regarding the impact of regulation changes on Formula One, quoting; *'Hitting speeds of well over 200 miles per hour, our cars are the fastest and most aerodynamic on the closed circuit. We--the drivers--have the most high-end gadgets and take the most risks. Yet a number of recent changes to the rules threaten to make Formula One less innovative and, potentially, less technically challenging'* (Coulthard, 2010). In response to this, Roy (2010) would however suggest; *'people say they want more overtaking and they think F1 should be a high tech formula. Well you can't have both. History shows the higher tech the car the more difficult overtaking is'.*

2.6 TV Viewing Figures

Noble and Hughes (2003) characterise Formula One as a *'fantastic high-tech, high entertainment, high-drama show of today'*, further claiming; *'TV viewing figures across the globe are measured in billions, putting the sport on a par with the soccer*

World Cup and the Olympic Games’. In 2008, a document published by Williams F1 claimed Formula One at the time had the largest annual TV audience of any sport broadcast globally, with a total of 597 million viewers tuning in to watch the 18 races between March and November, equating to 1.5 million minutes of TV coverage (Potter, 2008). Significantly, each race was broadcast by free-to-air terrestrial network coverage in 188 countries, reaching 90% of households in the top twenty global markets (Potter, 2008). However, in more recent years, statistically Formula One viewing figures have been dropping significantly year on year (Nelson, 2016) and according to Walker (2016) between 2008 and 2016 Formula One had lost a third of its audience worldwide, which had now fallen to 390 million (Sylt, 2017). There are various theories on the decline in TV viewing numbers for Formula One experienced over recent years, with decline notably beginning back in 2008, which coincidentally was the same time the global recession began to take its toll on the economy (Walker, 2016). This theory could well support the opinion of Sylt (2017) who suggests that Formula One had lost a total of 137 million viewers since 2010 as a result of switching the majority of races to a pay TV platform, dividing coverage with free-to-air TV. Evidently this trend could look set to continue, as it was reported by Jackson (2016) that Sky broadcasting had been awarded the exclusive rights to show Formula One racing in UK from 2019 until 2024, meaning the vast majority of viewers wishing to watch races would have to sign up to a pay-TV subscription (Jackson, 2016).

Comparatively, the sport of Cricket also provides a compelling example of the detrimental effects of a sport switching from free-to-air TV to pay-TV. According to Richards (2017); *‘The 2005 Ashes on Channel Four hit a peak audience of 8.4m compared to the final day of England’s first Test victory against Australia in 2015 which had an audience on Sky of 467,000.’* However, as Sylt (2017) points out, the failure of Lewis Hamilton securing his fourth World Championship Title combined with TV coverage moving from BBC to Channel four in Britain, were likely contributing factors for the 10 million slump in viewers experienced in 2016 in Formula One, with the British audience accounting for over half of this figure.

Despite strong evidence suggesting the movement from free-to-air to a pay-TV platform could be to blame for declining viewing figures, Nelson (2016) strongly proposes that an exciting Championship battle between top rival competitor teams such as Mercedes, Ferrari and Redbull would vastly increase viewing figures once again, denoting a lack of entertainment value and competitiveness as contributing factors for the declining numbers. Hugh Chambers, Group Manager of BAR Formula One race team 1999-2005 echoed a similar viewpoint regarding the importance of Formula One as an entertaining spectacle in relation to viewer numbers, stating; *'Formula One is entertainment. We are competing for the entertainment time of consumers. They've got lots of other things they can do if Formula One becomes boring, if it doesn't provide a spectacle'* (Couldwell, 2003, p.105).

2.7 Grand Prix Format Change

Hockley (2015) strongly advocates that Formula One needs a *'radical reform'* to alleviate the declining TV audiences, and further proposes that a change in race format could provide the solution. Currently a Formula One race event takes place over Friday to Sunday, with two one and a half hour free practice sessions on Friday, followed by three qualifying sessions intended to last one hour on Saturday which determines the overall starting grid positions for drivers for the main race on Sunday. The driver who registers the quickest qualifying time starts on pole position, followed by the second quickest qualifying driver and so on (Mastromarco et al., 2009). According to Hockley (2015); *'A better format would be: Friday: FP1 and FP2 for two hours each. Late Saturday morning: qualifying. Mid Saturday afternoon: 45-minute total reversed-grid race, with reduced world championship points on offer. Sunday: grand prix as per usual'*. Hockley (2015) points out an increase of *'thrill factor'* for spectators, along with extended broadcasting and exposure of lesser Formula One teams as potential advantages, but also alludes to the fact that the current points system would have to be modified to ensure the Grand Prix winner is not outscored by another driver over the weekend.

Former Formula One Chief Executive Bernie Ecclestone would also propose a similar concept to that of Hockley (2015), stating; *'Cars would qualify on a Saturday as usual for the first race and that would set the grid for the second'* (Thorn, 2017).

Interestingly, The Sunday Business Post (2008) reported that due to market research findings, Formula One grand prix distances could be shortened in the future. This is further supported by Braham (2008), who suggests; '*Trends in circuit design have been towards shorter, slower tracks that are not only safer but also more suitable for the TV coverage*'. Ecclestone would also further propose that in response to a call for more entertainment racing, Formula One would consider the use of sprinkler systems as an artificial aid to resemble 'fake rain' simulating wet race conditions. It can be argued that this could however go against the drive by The FIA to minimise driver risk and maintain the safety (Braham, 2008).

In conclusion, many of the sources cited in this review of literature raise the issue of a notable conflict between technological innovation, improving and maintaining safety, and spectator entertainment. Different stakeholders would appear to have different priorities. Manufacturers and drivers alike are striving for cutting edge technology that keeps them well ahead of the field, even incorporating additional measures in to the design of Formula One cars to disadvantage competitors. Spectators on the other hand, are naturally engaged by closer competition and the thrill of close battles on the track, and the potential risks these bring. This conflict can be seen to permeate the discussion of the various perspectives regarding motorsport documented from the late 19th century onwards. Whilst the effect of technological innovation, resulting safety changes, and proposed changes to Grand Prix race format have been documented throughout the literature review, a notable gap in the research has also been identified regarding spectator viewing behaviours when watching a Formula One race. This will help inform the planning of a strategy to gather research data in order to address the proposed research questions.

3. Methodology

The initial review of literature surrounding the topic area raised questions about the present 'entertainment' value of modern Formula One from the perspective of fans, and elements of a Formula One race which could influence fan viewing behaviours. This chapter identifies and discusses the appropriate research philosophies, the research paradigm selected to support the study, and the resulting methods that were applied. Saunders et al., (2015) strongly advocate that our beliefs and assumptions as researchers can have an influencing effect on the methodology and research methods adopted when pursuing or conducting research. Consequently, it is essential for the researcher to understand the ontological and epistemological aspects of the study, which help determine the theory and methods chosen.

Saunders et al., (2015, p.124-125) propose that; *'A well thought-out and consistent set of assumptions will constitute a credible research philosophy, which will underpin your methodological choice, research strategy and data collection and analysis procedures'*. Use of the right philosophy carries great significance when planning and conducting the research. The challenge, according to Blaikie and Priest (2017), is to identify a research paradigm that provides the researcher the best chance of answering the proposed research question using ontological and epistemological approaches and assumptions. Saunders research onion, illustrated in Figure 3, is a tool that can be used to identify the appropriate research paradigm, and determine how the data is going to be collected and which methods will be used. Beginning with the outer layer known as the 'research philosophy', each layer is 'peeled' away working from the outside towards the middle of the research onion. As each layer is examined to determine the best approach, the research method strategy will be formulated and the overall methodology will be determined.

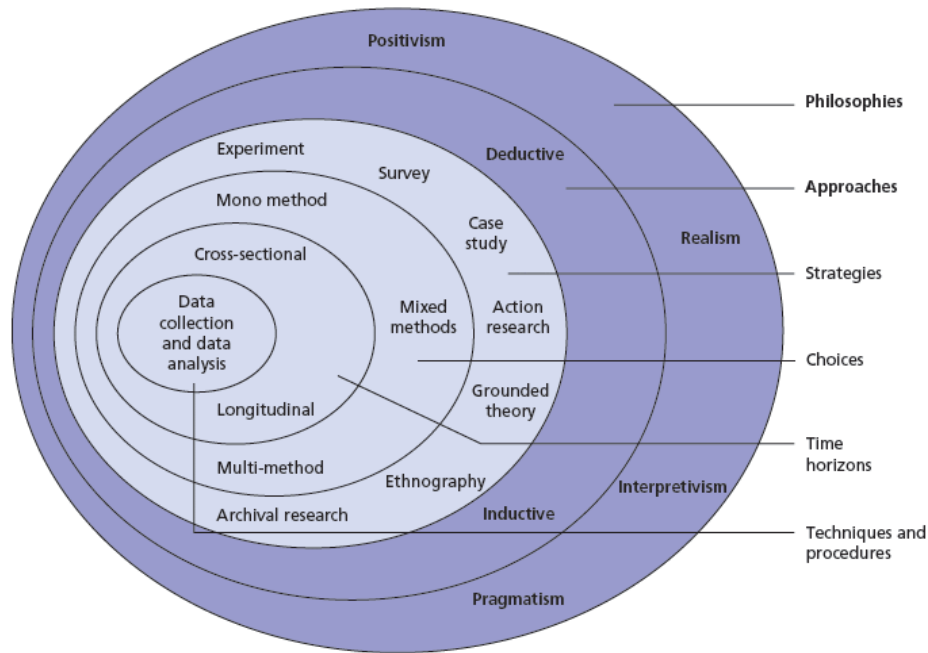


Figure 3.1 – Saunders research 'onion' (Saunders et al., 2012)

3.2 Ontology and Epistemology

According to Wahyuni (2012) a research paradigm is a set of fundamental assumptions and beliefs that aim to address the philosophical elements of social sciences. Laughlin (1995) states the two principal philosophical dimensions which comprise a research paradigm are ontology and epistemology. Ontology concerns the assumptions about the reality of nature and defines the way in which the researcher views the study and research objects (Saunders et al., 2015). In order for the researcher to understand the theory behind ontology, Scotland (2012, p.9) suggests that; *'Researchers need to take a position regarding their perceptions of how things really are and how things really work'*. Whilst ontology and epistemology provide the two fundamental philosophies, additionally there are two underlying beliefs which the researcher's attention should be drawn to as they can greatly influence the way researchers investigate, these beliefs are known as the methodology and axiology (Wayhuni, 2012). Axiology relates to the ethics and values involved with conducting research, incorporating the researcher's stance on the subject area, whilst methodology provides the model for the research process in coherence with the selected research paradigm (Wayhuni, 2012).

When regarding social research, Saunders et al., (2015) suggest the first aspects of ontology to consider are objectivism and subjectivism. Describing the relationship between ontology and objectivism, Wahyuni (2012) proclaims that; *'ontologically one can perceive that the existence of reality is external and independent of social actors and their interpretations of it, termed objectivist'*. The theory of Wahyuni (2012) is supported by Saunders et al., (2015), who suggest that ontologically it must therefore be accepted that objectivism also embraces similarities to realism, described as a social entity that is seen as a physical entity of the natural world. Saunders et al., (2015) define subjectivism on the other hand as a social reality that is constructed from perceptions and the consequent actions of social actors in relation to experienced social phenomena.

Guba and Lincoln (1994) describe epistemology as asking the question of association between the 'knower' and what can be known? According to Blaikie and Priest (2017), epistemology shares a close relationship with ontology regarding assumptions of how the social world is viewed and the accessible choices for increasing knowledge of that world. Epistemology is concerned with assumptions about knowledge, how knowledge can be generated, obtained and communicated to others (Scotland, 2012). Saunders et al., (2015, p.127) also argue that a fundamental aspect of epistemology is the constitution of *'acceptable, valid and legitimate knowledge'*. Saunders et al., (2015) propose that epistemology is principally associated with the philosophies of positivism, realism and interpretivism, with realism situated between the opposing positivism and interpretivism philosophies.

A positivist's perspective in relation to epistemology is considered to be one of objectivism, with Scotland (2012, p.10) suggesting that; *'Positivists go forth into the world impartially, discovering absolute knowledge about an objective reality'*. Scotland (2012) further describes the position of positivism in ontology as one of realism, citing Cohen et al., (2007, p.7); *'Realism is the view that objects have an existence independent of the knower'*. As positivism is associated with a philosophical stance towards that of the social scientist, the researcher cannot form subjective judgement with this approach as it is associated with obtaining measurable observations of social reality to formulate 'law-like' conclusions

(Saunders et al., 2015). The positivist approach provides an unequivocal and accurate undertaking to acquiring knowledge scientifically without the influence of the researcher on the research.

Wahyuni, (2012) suggests that interpretivists form the viewpoint that reality is fabricated by social actors and the perception of individuals opinions of reality, further stating; *'individuals with their own varied backgrounds, assumptions and experiences contribute to the on-going construction of reality existing in their broader social context through social interactions'*. According to Hennik et al., (2011) an interpretivist acknowledges that human experiences and perspectives are subjective, and that aspects of social reality can change leading to a multitude of perspectives. Saunders et al., (2015) advocate that interpretivism was developed to critique the philosophy surrounding positivism from a subjective viewpoint, and therefore interpretivists can be seen to reject objectivism and the single truth approach, both of which comprise the 'post-positivism' theory. Before discussing the theory of post-positivism, the philosophy of 'pragmatism' should also be considered, which can merge both positions of positivism and interpretivism to create a 'single scope' outlook, albeit dependent on the initial research question proposed (Saunders et al., 2012). Pragmatism acknowledges that there are multiple ways of interpreting the world and how we research that world, concluding as a result no viewpoint can ever be accepted which gives the entire picture, and that multiple realities exist (Saunders et al., 2012).

3.3 Post-positivism

Trochim (2006) suggests that people's scientific views have changed markedly since the midpoint of the twentieth century, with a noticeable paradigm shift moving away from the largely dominated position of positivism to the post-positivism theory. Post-positivism is described by Trochim (2006) as; *'A wholesale rejection of the central tenets of positivism'*. Trochim (2006) suggests that a post-positivist recognises that the way in which scientists think and work is not dissimilar to how people think ordinarily in day-to-day life, stating that the only appreciable difference between the two is a difference in degree. Post-positivism is closely linked to the philosophy of 'critical realism', the belief that an independent reality exists of our thinking that can

be studied scientifically (Trochim, 2006). According to Saunders et al., (2015, p.138); *'The philosophy of critical realism focuses on explaining what we see and experience, in terms of underlying structures of reality that shape the observable events'*. Trochim (2006) further proposes that; *'Positivists were also realists. The difference is that the post-positivist critical realist recognizes that all observation is fallible and has error and that all theory is revisable'*.

Based on the opinions of Saunders et al., (2015) and Trochim (2006), it would appear that post-positivism is situated between the paradigms of positivism and realism which evidently appear to be similar, if not the same in practice. As the development of knowledge through a 'post-positivist lens' is via careful observation and measurement of an existing objective reality, this can be considered to be the most suitable approach for the researcher when dealing with quantitative research data through an experimental strategy. Furthermore, the deterministic nature of a post-positivist will often lead to further enquiry to pursue and identify the influencing factors from the resulting outcome of the initial experiment (Sagepub.com, 2008). With these explanations in mind, adopting a post-positivist realist approach was deemed appropriate for studying the viewing behaviours of Formula One fans and elements of a Formula One race which could be modified to enhance viewer entertainment.

3.4 Deductive Logic

After identifying the appropriate philosophy and research paradigm, the second layer of Saunders research onion deals with the 'logic of inquiry', often referred to as research strategy (Blaikie and Priest, 2017). There are three main types of logic of inquiry available to the researcher known as deductive, inductive and abductive (Blaikie and Priest, 2017). For the purpose of this study a deductive approach was used as it offers the most suitable approach when adopting a theoretical position to the proposed research question, which can then be tested through the collection and analysis of data to determine whether the question can be confirmed or rejected (Saunders et al., 2015).

3.5 Survey

The third layer of Saunders research onion concerns the research methods available to the researcher for gathering the data, with survey and experimental research providing the most appropriate strategies for dealing with quantitative data (Babbie, 1990). As survey research demonstrates numeric trends relating to the attitudes and beliefs of a targeted population sample, this method of research was accepted to be the most suitable for carrying out the study. However, before implementing this strategy the researcher should take in to consideration the following benefits and limitations of survey research.

Benefits

- Can be designed relatively quickly and easily administered
- Capability of collecting a variety of data from a large population sample
- Collected data can be analysed using statistical software packages which allows for comprehensive analysis
- Low cost implementation
- Relatively low risk of error
- Respondents maintain anonymity

Limitations

- Lack of motivation from respondents could lead to inaccurate or dishonest answers
- Boredom experienced by respondents filling out the survey could lead to non completed surveys or inaccurately completed surveys
- Despite anonymity, respondents could be swayed to provide answers which do not portray them in a negative way, thus skewing the data
- Question and answers are likely to be interpreted differently by each respondent
- Non responses could potentially lead to errors in the overall data (DeFranzo, 2012)

With the research method strategy now starting to take shape, the final few layers of Saunders onion can now be considered to determine the overall methodology. The fourth layer of Saunders onion represents the best method for dealing with quantitative and qualitative methods for the purpose of the research (Saunders et al., 2015). For the purpose of this study, the mono-method approach was chosen in accordance with Saunders et al., (2015, p.166) who suggest that; *'A quantitative research design may use a single data collection technique, such as a questionnaire, and corresponding quantitative analytical procedure. This is known as a mono method quantitative study'*.

The fifth layer of Saunders onion relates to the time horizon aspect of the study. Saunders et al (2015, p.200) state that it is of paramount importance during the initial research design stages to ask the question of; *Do I want my research to be a "snapshot" taken at a particular time or do I want it to be more akin to a diary or series of snapshots and be a representation of events over a given period?*. Presented with the question, it was determined that the approach will be cross-sectional, as this deals with the 'snapshot' time horizon which best describes the study, whilst longitudinal refers to the manner of a 'diary' (Saunders et al, 2015). The sixth and final layer of Saunders onion covers the processes involved in data collection and analysis, reflecting the proposed questionnaire content and the identified target sample group, both of which will be covered in depth in this chapter.

3.6 Pilot Survey

An essential part of conducting a survey is to test the efficiency in the method (Mae Sincero, 2012). In order to achieve this, a provisional pilot survey was created and distributed amongst 5 friends/family members, of who were known to watch Formula One. The aim was to establish the level of understanding of the survey instructions, clarity of the questions asked, and the timeframe for answering questions and completing the survey. Chuboda (2018) recommends a survey containing between 16 and 25 questions should take no longer than 7-9 minutes to complete, averaging 21 seconds per question. However, this does not take in to consideration the style of questions asked. The pilot survey distributed contained 17 closed style questions, the target was for the pilot survey to be completed in under 5 minutes, and to identify

questions that were particularly time consuming or difficult to comprehend for the respondents. Establishing the correct quantity of questions and timeframe was important to prevent respondents from 'satisficing' or 'speeding' through the survey which could affect the quality and reliability of the data gathered (Chuboda, 2018).

The survey was piloted in April 2018, with all 5 pilot surveys completed and returned only reporting minor issues which are as detailed;

- **Question Formatting** – two respondents highlighted that questions which specified the option of selecting 'ONE', 'THREE', 'LIVE' were not clear enough, recommending that use of a larger font size should help make these options clearer for future respondents. Subsequently the font size was increased to accentuate these options.
- **Contact Information** – one respondent recommended that contact information should be added to the survey so completed/misplaced surveys could be returned and further feedback could be provided if the respondent wished to do so. After considering the feedback, a point of contact in the form of an email address was included in the last section of the survey.
- **Timeframe** – whilst all surveys were reportedly completed in the target timeframe of under five minutes, two respondents commented on the Likert scale style of questions, stating that not having the option available to select 'neutral' or 'no opinion' for the respondent made answering these questions particularly time consuming due to the thought process involved. The feedback was taken on board, and after careful consideration the decision was made to keep the question structure the same, a decision which will be justified and explained in the final questionnaire section in this chapter.

The pilot survey proved a useful tool, with the feedback received highlighting only minor issues which were easily rectified. Also, whilst instructions for answering highlighted survey questions required slight reformatting, question content was fully understood by respondents and all surveys were answered within the under five minutes target timeframe. With only minor changes required, there was no need to retest the pilot before executing the final questionnaire.

3.7 Final Questionnaire

The final questionnaire was comprised of 17 concise closed style questions, designed to efficiently gather demographic information of Formula One fans viewing behaviours and the current perception of Formula One as an 'entertainment'. The resulting aim of the questionnaire was to recognise any noticeable trends, and identify elements of a Formula One race which fans wish to see modified to enhance viewer entertainment. In order to maximise the results and accuracy of the data gathered careful consideration was taken during the initial design stages. For example, the original questionnaire spanned over two double sided pages, the decision was later made for all questionnaires to be printed on single sided paper to avoid respondents missing or skipping over pages or questions.

3.7.1 The Questions

- The first question presented in the questionnaire determined whether or not the potential respondent watched Formula One. Establishing this at the beginning of the survey was critical to ensure the respondent's time and that of the questioner was not misused and accuracy of the data was maintained.
- After establishing that the respondent watched Formula One, questions two and three were demographical questions which aimed to gather the gender and age information of the respondents. This information was used to identify any noticeable trends in the demographics during the analysis of the data.
- Questions four to six, and question eight aimed to gauge the viewing behaviours of Formula One fans. Question four and five investigated fan viewing behaviours relating to viewing methods and number of races watched per season, whilst question six targeted the proportion of respondents who subscribe to watch Formula One races. Question eight probed the viewing habits of respondents during a live race, of which the initial review of literature highlighted a distinct lack of studies in this area.

- Question seven presented the respondent the opportunity to express which aspects of watching a Formula One race they considered to be the most exciting, with the option of selecting up to three choices out of a possible nine available. This question was asked to ascertain if there was an observable bias from respondents towards certain elements, which could then be used to for further investigation during the analysis.
- Questions nine to sixteen were structured in the form of a 4 point Likert scale, with the following options; strongly agree, agree, disagree, strongly disagree available to the respondent. The 4 point Likert scale was adopted to encourage respondents to provide an opinion as there is no safe 'neutral' or 'no opinion' available (Chaudhary, 2012). Before proceeding to the questions, respondents were however instructed that if they did not feel able to comment on a particular question or give an opinion to leave blank. The question content was formulated in response to the various opinions collated in the initial review of literature, gathering opinions of respondents presented with statements regarding; technical innovation, driver skill, speed, refuelling, race format, regulations and history and heritage of Formula One.
- Question seventeen closed the questionnaire by asking respondents to state their position on whether they would favour the introduction of artificial methods to encourage more entertaining racing. This question was asked in response to Braham (2008) from the initial review of literature.

4. Analysis and Results

In this chapter, primary data collected via the questionnaire is presented and analysed using the IBM Statistical Package for Social Sciences (IBM SPSS). The gathered data is non-parametric, allowing for formulated hypotheses to be tested using the Chi-Square test function to determine the statistical relationship between two categorical variables. The resulting P value can then be used to interpret the result. Phi and Cramer's V level of association, as illustrated in figure 4.1, is used to further determine the strength of association between two variables.

	Small Effect	Medium Effect	Large Effect
For $df^* = 1$	0.10	0.30	0.50
For $df^* = 2$	0.07	0.21	0.35
For $df^* = 3$	0.06	0.17	0.29

Figure 4.1 - Phi and Cramér's V level of association table (Droesch, 2015)

4.2 Demographics

A total of 180 questionnaires were distributed and 143 were returned, of which 128 were deemed appropriate for final use. 15 questionnaires were discarded on the basis of incomplete or incorrect information. As shown in figure 4.3, 72% of the respondents were males and 28% were females, highlighting a gender imbalance in the data collection. This notable difference in gender frequencies was taken into consideration throughout the analysis.

Figure 4.3 Respondents by Gender

		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	92	71.9	71.9	71.9
	Female	36	28.1	28.1	100.0
	Total	128	100.0	100.0	

4.4 Respondents by Age

For the purpose of conducting statistical analysis, age of respondents was grouped in to three separate categories using the SPSS recoding function, shown in figure 4.5. Figure 4.5 shows that the majority of respondents were aged 30 or under (54%), respondents aged between 31 and 50 accounted for 32.0% of the sample, and aged 51+ 14%. As it is evident these categories are imbalanced, it is essential when performing statistical tests such as the Chi-Square that validity of the test is confirmed and interpretation of the results is considered with this in mind.

Figure 4.5 Respondents by Age

AgeGrouped3		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30 or under	69	53.9	53.9	53.9
	31-50	41	32.0	32.0	85.9
	51+	18	14.1	14.1	100.0
	Total	128	100.0	100.0	

With the demographic information presented, the age and gender of respondents will provide the foundation for the statistical analysis and subsequent formulation of any hypotheses, to identify any trends in the data. The first stage of the analysis will aim to establish if there is an identifiable relationship between the demographics of respondents and viewing behaviours. Details of all performed tests can be found in the appendices section of this paper.

Figure 4.6 Summary of tests performed on respondent viewing behaviours

	Q4 Watch method	Q5 No. Of races watched per season	Q6 Subscribe to watch Formula One	Q8 Viewing habits watching live race
Q2 Gender	X=2.458a, df=3, p=.483	X=4.859a, df=3, p=.182	X=2.652a, df=2, p=.266	X=10.342a, df=2, p=.006**
Q3 Age	X=22.544a, df=6, p=.001***	X=7.828a, df=6, p=.251 FET = .304	X=8.406a, df=4, p=.078	X=.984a, df=2, p=.612 FET = .788

	No statistical significance - Null hypothesis accepted (H0)
	Statistical significance – Alternative hypothesis accepted (H1)
*P≤0.05 – Statistical significance **P≤0.01 – High statistical significance ***P≤0.001 – Very high statistical significance	

4.7 - Chi-Square test for Gender (Q2) and viewing habits when watching a live Formula One race (Q8)

H₀ – There is no significant difference between gender and viewing habits when watching a live Formula One Race

H₁ - There is a significant difference between gender and viewing habits when watching a live Formula One Race

For the purpose of this test, the variables were recoded in to three separate categories; watching the entire race duration, watching various parts of the race, and watching highlights only. The test result ($\chi^2=10.342^a$, df=2, p=.006) indicates that there is a high statistical significance in terms of the difference between males and females and viewing habits when watching a live Formula One Race. Therefore, the null hypothesis (H₀) is to be rejected and the alternative hypothesis (H₁) is accepted. Using Cramer's V value of .284, it can also be determined that the strength of association between the two variables is weak.

The results from the cross tabulation show that 48% of male respondents watch the entire race duration, in comparison to only 19% of females. 72% of females watched various parts of the race compared to 41% of males. There was no significant difference between the percentage of males (11%) and females (8%) who watch highlights only. After observing the differences in viewing behaviours between males and females, further analysis is to be carried out to establish any further trends in the viewing behaviours of respondents.

4.8 - Chi-Square test for Age (Q3) and method used to watch a live Formula One Race (Q4)

H₀ – There is no significant difference between age and method used to watch a live Formula One Race

H₁ - There is a significant difference between age and method used to watch a live Formula One Race

The test result ($\chi^2=22.544^a$, $df=6$, $p=.001$) indicates that there is a very high statistical significance in terms of the difference between age and method used to watch a live Formula One Race. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted.

Within the 51+ age group 61% of respondents watch live TV coverage, 33% highlights, and 6% recorded/catch-up TV. There were no respondents who listed live streaming to a device as a common viewing method.

Within 31-50 age group, live TV coverage was again the most commonly selected response with 51%, however there is a more even distribution across the other three categories with watching highlights being the least favourable method at 10%.

In the 30 or under category, the most favoured method of viewing is live streaming to a device (39%) in stark contrast to the findings reported from the 51+ category. There is a fairly even distribution across the other three watching methods.

Figure 4.9 Summary of tests performed on respondents choices for Question 7a-7h

	Q7a Overtaking	Q7b Tech innovations	Q7c Speed/performance of cars	Q7d Risks/potential high speed crashes	Q7e Championship battles	Q7f Supporting driver or team	Q7g Start of race/opening laps	Q7h Pitstops
Q2 Gender	X=3.969a, df=1, p=.046*	2.208a, df=1, p=.137	X=2.620a, df=1, p=.106	X=1.898 a, df=1, p=.168	X=.579a, df=1, p=.447	X=27.989 a, df=1, p=.000***	X=409a, df=1, p=.522	X=10.464a df=1, p=.001***
Q3 Age	X=1.641a, df=2, p=.440	X=7.460a, df=2, p=.024*	X=9.581a, df=2, p=.008**	X=12.26 1a, df=2, p=.002**	X=.695a, df=2, p=.706	X=1.975a, df=2, p=.372	X=1.632a, df=2, p=.442	X=4.423a df=2, p=.110

	No statistical significance - Null hypothesis accepted (H0)
	Statistical significance – Alternative hypothesis accepted (H1)
*P≤0.05 – Statistical significance **P≤0.01 – High statistical significance ***P≤0.001 – Very high statistical significance	

4.10 - Chi-Square for Gender (Q2) and overtaking (Q7a)

H₀ – There is no significant difference between gender and question 7a

H₁ - There is a significant difference between gender and question 7a

The test result ($\chi^2=3.969^a$, df=1, p= .046) indicates that the test is statistically significant, suggesting there is a difference between gender and overtaking. Therefore, the null hypothesis (H₀) is to be rejected and the alternative hypothesis (H₁) is accepted. Cramer's V value of .176 indicates that the strength of association between the two variables is of small effect. Interpreting the results from the cross tabulation, it can be observed that 76% of males identified 'overtaking' as a top three choice when asked to select three options which they consider to be the most

exciting aspects of a Formula One race. In comparison, 58% of females selected overtaking as a top three option. Whilst it can be said from this result that the majority of males and females identify overtaking as one of the most exciting aspects of a Formula One race, it is evident that males are much more highly in favour of overtaking in Formula One.

4.11 - Chi-Square for Gender (Q2) and supporting a certain team or driver (Q7f)

H₀ – There is no significant difference between Gender and Question 7f

H₁ - There is a significant difference between Gender and Question 7f

The test result ($\chi^2=27.989^a$, $df=1$, $p=.0000$) indicates that there is very high statistical significance in terms of the difference between gender and supporting a certain team or driver. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Cramer's V value of .468 indicates that the strength of association between the two variables is of medium effect. A significant discrepancy can be observed between males and females in the result, with 53% of females opting for 'supporting certain team or driver' when presented the opportunity to select three options they consider the most exciting aspects of a Formula One race, in contrast to only 10% of males.

4.12 - Chi-Square for Gender (Q2) and pit stops (Q7h)

H₀ – There is no significant difference between Gender and Question 7h

H₁ - There is a significant difference between Gender and Question 7h

The test result ($\chi^2=10.464^a$, $df=1$, $p=.0001$) indicates that there is very high statistical significance in terms of the difference between gender and pit stops. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Cramer's V value of .286 indicates that the strength of association between the two variables is of small effect. Observing the results, it is evident that a larger proportion of females (33%) selected 'pit stops' in comparison to 10% of males.

4.13 - Chi-Square for Age (Q3) and technological innovations (Q7b)

H₀ – There is no significant difference between Age and Question 7b

H₁ - There is a significant difference between Age and Question 7b

The test result ($\chi^2=7.460^a$, $df=2$, $p=.0024$) indicates that test is statistically significant, suggesting there is a difference between age and technological innovations. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Cramer's V value of .241 indicates that the strength of association between the two variables is of medium effect. It can be interpreted from the cross tabulation result that a significant proportion of respondents age 51+ (28%) chose technological innovations as a top three option, compared to age 31-50 (17%) and 30 or under (6%).

4.14 - Chi-Square for Age (Q3) and speed and performance of cars (Q7c)

H₀ – There is no significant difference between Age and Question 7c

H₁ - There is a significant difference between Age and Question 7c

The test result ($\chi^2=9.581^a$, $df=2$, $p=.008$) indicates that the test is highly statistically significant, suggesting there is a difference between age and speed and performance of cars. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Cramer's V value of .274 indicates that the strength of association between the two variables is of medium effect. The results suggest a disparity between the age groups tested, with 33% of respondents aged 51+, and 32% of 31-50 selecting 'speed and performance of cars' as a top three option in comparison to only 10% in the age 30 or under category.

4.15 - Chi-Square for Age (Q3) and risks and potential drama for high speed crashes Q7d

H₀ – There is no significant difference between Age and Question 7d

H₁ – There is a significant difference between Age and Question 7d

The test result ($\chi^2=12.261^a$, $df=2$, $p=.002$) indicates that the test is highly statistically significant, suggesting there is a difference between age and risks and potential drama for high speed crashes. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Cramer's V value of .310 indicates that the strength of association between the two variables is of medium effect. The results indicate that a high proportion of respondents aged 30 or under (55%) selected 'risks and potential drama for high speed crashes' as a top three option for choosing most exciting aspects of a Formula One race. In comparison 37% of respondents aged 31-50 selected this option as a top three choice, and only 11% of respondents age 51+.

Figure 4.16 Summary of tests performed on respondents opinions for questions 9-17.

	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
Q2 Gender	X=1.061a , df=1, p=.303	X=9.907a , df=1, p=.002**	X=3.055a , df=1, p=.081	X=.177a, df=1, p=.674	X=7.420a , df=1, p=.006**	X=15.043a , df=1, p=.000***	X=0.50a, df=1, p=.823	X=6.030a , df=1, p=.014*	X=16.997a , df=1, p=.000***
Q3 Age	X=.573a, df=2, p=.751	X=1.990a , df=2, p=.370	X=9.578a , df=2, p=.008**	X=5.007a , df=2, p=.082	X=1.449a , df=2, p=.485	X=14.242a , df=2, p=.001***	X=1.410a , df=2, p=.494	X=2.150a , df=2, p=.341	X=17.524a , df=2, p=.000***

	No statistical significance - Null hypothesis accepted (H0)
	Statistical significance – Alternative hypothesis accepted (H1)
*P≤0.05 – Statistical significance **P≤0.01 – High statistical significance ***P≤0.001 – Very high statistical significance	

4.17 - Chi-Square test for Gender (Q2) and technological innovation versus driver skill (Q10)

H₀ – There is no significant difference between gender and question 10

H₁ - There is a significant difference between gender and question 10

127 out of 128 respondents answered question 10. Due to insufficient responses across the original data categories, the options of strongly agree, agree, disagree and strongly disagree were recoded in to two variables of agree and disagree for questions 9 to 16.

The test result ($\chi^2=9.907^a$, $df=1$, $p=.002$) indicates that there is a high statistical significance in terms of the difference between gender and technological innovation versus driver skill. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Interpreting Cramer's V value of .279 shows that the strength of association between the two variables is of small effect. The results suggest that both male and female respondents agree that 'Formula One would be more entertaining for viewers if there was less reliability on technological innovation of cars and more reliance on driver skill'. It is however evident from the result that a significantly higher proportion of females (92%) agree with the presented statement in comparison to 64% of males.

4.18 - Chi-Square test for Gender (Q2) and re-introduction of midrace refuelling to enhance viewer entertainment (Q13)

H₀ – There is no significant difference between gender and question 13

H₁ - There is a significant difference between gender and question 13

The test result ($\chi^2=7.420^a$, $df=1$, $p=.006$) indicates that there is a high statistical significance in terms of the difference between gender and re-introduction of midrace refuelling to enhance viewer entertainment. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Interpreting Cramer's V value of .241, it can be said that the strength of association between the two variables is of small effect. The result of the cross tabulation indicates that the majority of male and female respondents agree that 're-introduction of midrace re-

fuelling will greatly enhance viewer entertainment'. However, there is a significant disparity identified between the respondents, with 92% of females who agree with this statement in comparison to 69% of males.

4.19 - Chi-Square test for Gender (Q2) and over regulation of Formula One (Q16)

H₀ – There is no significant difference between gender and question 16

H₁ - There is a significant difference between gender and question 16

The test result ($\chi^2=6.030^a$, $df=1$, $p=.014$) indicates that there is a statistical significance in terms of the difference between gender and over regulation of Formula One. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Interpreting Cramer's V value of .221, highlights that the strength of association between the two variables is of small effect. The results state both male and female respondents agree that 'Formula One is over regulated'. It is however evident that a higher proportion of females (94%) agree with the presented statement in comparison to 74% of males who agreed.

4.20 - Chi-Square for Gender (Q2) and favouring the introduction of artificial methods to provide more entertaining racing (Q17)

H₀ – There is no significant difference between gender and question 17

H₁ - There is a significant difference between gender and question 17

The test result ($\chi^2=16.997^a$, $df=1$, $p=.000$) indicates that there is a high statistical significance in terms of the difference between difference gender and favouring the introduction of artificial methods to provide more entertaining racing. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Cramer's V value of .364 indicates that the strength of association between the two variables is of large effect. Observing the results presented in the cross tabulation, it is again evident that there is a vast difference of opinion between male and female respondents, with 64% of females stating to be in favour of introducing artificial methods to provide more entertaining racing, in comparison to only 25% of males.

4.21 - Chi-Square test for Age (Q3) and the positive impact of driver aids on making racing more competitive (Q11)

H₀ – There is no significant difference age and question 11

H₁ - There is a significant difference between age and question 11

120 out of 128 respondents answered question 11. The test result ($\chi^2=9.578^a$, $df=2$, $p=.0028$) indicates that there is a high statistical significance in terms of the difference between age and the positive impact of driver aids on making racing more competitive. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Interpreting Cramer's V value of .364, shows that the strength of association between the two variables is of medium effect. The result states the majority of respondents agree that 'introduction of driver aids have had a positive impact in terms of making racing more competitive'. Interpreting the result of the cross tabulation it is apparent that 92% of respondents aged 30 or under agreed with this statement, compared to 70% for age 31-50 and 51+. The result suggests that a significant amount of Formula One fans aged 30 or under believe that driver aids are beneficial for promoting competitive racing.

4.22 - Chi-Square test for Age (Q3) and changing race format (multiple race format, decreased race duration) over a Grand Prix weekend to enhance viewer entertainment (Q14)

H₀ – There is no significant difference between age and question 14

H₁ - There is a significant difference between age and question 14

127 out of the 128 respondents answered question 14. The test result ($\chi^2=14.242^a$, $df=2$, $p=.001$) indicates that there is a very high statistical significance in terms of the difference between age and changing race format (multiple race format, decreased race duration) over a Grand Prix weekend to enhance viewer entertainment. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Interpreting Cramer's V value of .335 shows that the strength of association between the two variables is of medium effect. The result suggests that a significant proportion of respondents age 30 or under agree that 'changing current

race format (multiple race format, decreased race duration) will enhance viewer entertainment' (62%). Interestingly, only 32% of respondents age 31-50 were in favour of this statement and 22% of 51+. A notable trend within the age group of respondents can be identified, it would appear that the younger Formula One fans are much more in favour of changing the current race format.

4.23- Chi-Square for Gender (Q2) and changing race format (multiple race format, decreased race duration) over a Grand Prix weekend to enhance viewer entertainment (Q14)

H₀ – There is no significant difference between gender and question 14

H₁ - There is a significant difference between gender and question 14

The test result ($\chi^2=15.043^a$, $df=1$, $p=.000$) indicates that there is a high statistical significance in terms of the difference between males and females and changing the current Grand Prix race format. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Interpreting Cramer's V value of .344, the strength of association between the two variables is moderate. Interestingly, 74% of females asked are in agreement with changing the current Grand Prix race format to enhance viewer entertainment, in comparison to only 36% of males.

4.24 Chi-Square for Age (Q3) and favouring the introduction of artificial methods to provide more entertaining racing (Q17)

H₀ – There is no significant difference between age and question 17

H₁ - There is a significant difference between age gender and question 17

The test result ($\chi^2=17.524^a$, $df=2$, $p=.000$) indicates that there is a high statistical significance in terms of the difference between males and females and favouring the introduction of artificial methods to provide more entertaining racing. Therefore, the null hypothesis (H_0) is to be rejected and the alternative hypothesis (H_1) is accepted. Using Cramer's V value of .370, we can further determine that the strength of association between the two variables is of large effect. Observing the results

presented in the cross tabulation, it is apparent that a significant proportion (52%) of respondents age 30 or under are in favour of introducing artificial methods to provide more entertaining racing, compared to 20% of respondents age 31-50 , and 11% of respondents age 51+.

5. Conclusion

The null hypothesis which was tested in this study was;

H₀ – Formula One fans are not in favour of modifying current aspects of a Grand Prix race to enhance viewing entertainment.

Primary research was gathered via a questionnaire conducted on the 7th of April 2018 at Castle Combe circuit, South West of England, gathering data on 128 people who watch Formula One. The objective of the study was to collect data on viewing behaviours of Formula One fans and to identify elements of a Grand Prix race which could be modified to enhance viewer entertainment. After carrying the data analysis, a number of trends were identified from the results, with a large discrepancy witnessed between male and female respondents throughout the analysis in relation to viewing behaviours and perceptions of enhancing entertainment of a Formula One race.

5.1 Viewing Behaviours

The review of literature highlighted a notable gap in the research regarding the viewing behaviours of people who watch Formula One. Viewing behaviours of Formula One fans were subsequently investigated with the aim of bridging the apparent gap surrounding this topic area, which could then be used for further research purposes. Using statistical analysis it was determined that there was no significant disparity witnessed between the demographics of respondents and number of races watched per season, and those who subscribe to watch Formula One. The results however highlighted that 50% of people asked stated they watch various parts of a Grand Prix race, whilst 40% watch the entire race duration, with the remaining 10% watching highlights. Through further analysis procedures it was

established that a significant proportion of female respondents watch various parts of a Formula One race instead of the entire race duration compared to males, highlighting a notable discrepancy in the viewing habits of respondents.

A disparity amongst respondents and the most commonly used method of watching a Formula One race was also highlighted. Whilst the majority of respondents (67%) stated they most commonly watch live coverage of a Formula One race, of the 29% who use live streaming to a device, a significant proportion (39%) were identified to be age 30 or under. This finding could suggest that there is lack of awareness amongst older viewers about the availability of live streaming of Formula One races, although further study would be required to identify the influencing factors behind this trend.

5.2 Enhancing Viewer Entertainment

Notable variation regarding respondent's perceptions of what denotes an exciting Formula One race became apparent throughout this study, with a consistent trend of gender polarisation emerging throughout the data. Females appear to be strongly in favour of changing the current Grand Prix race format and of the introduction of artificial methods to provide more entertaining racing, whilst males prefer to maintain the status quo. Overall, only 36% of all respondents were in favour of introducing artificial methods to provide more entertaining racing, and whilst the majority of respondents (53%) disagreed with changing the current race format, it would seem that opinions on reducing race duration and introducing a multiple race format over a Grand Prix weekend are closely divided amongst people who watch Formula One. Overall, the findings do not reflect the opinions of Hockley (2015) and Mastromarco et al., (2009) cited in the review of literature, who strongly advocated the idea of changing the existing Grand Prix race format. It should be noted, however, that they did not document gender variation.

As documented by Errity (2015) and Roy (2010) in the review of literature, refuelling during a Formula One race was banned for the 2010 season. This study has, however, shown that a considerable majority of respondents (75%) are in favour of re-introducing mid race refuelling to enhance viewer entertainment, with a

significantly larger proportion of female respondents supporting this (92%) compared to 69% of males. This finding is again consistent with the disparity witnessed between males and females observed throughout the data. A significant proportion of female respondents (33%) further identify pit-stops as a top three choice (in comparison to only 10% of males) when identifying aspects of a Formula One race considered to be the most exciting.

It could be suggested that there is an interrelationship between the elements identified above. Refuelling could increase the number of pit-stops, which in turn would lead to more activity and therefore more overtaking opportunities midrace. It can be hypothesised that females are generally less satisfied than males with the entertainment value Formula One race provides, and are likely to be more engaged with watching the complete race duration if the discussed changes were implemented. However, this is in contrast to the trend identified with males, who form the majority of respondents, and therefore possibly the majority of race viewers. Careful consideration would be required before providers make changes to current Grand Prix format based on the perceptions of what can be considered as stakeholders who are under-represented in this research. It should also be noted that there is some potential conflict between the desire of females for implementing changes to Grand Prix format and their favouring of an increased emphasis on driver skill, which 92% of females agreed or strongly agreed with. Before significant changes to race format are considered appropriate, further research with a larger sample and a more equal gender balance would be required to explore these points further and to further validate the findings.

5.3 Recommendations

There are inevitable limitations with studies involving social sciences. The data presented in this study highlighted a demographical imbalance regarding gender and age of respondents. It is recommended that the study is replicated obtaining a larger sample size of more balanced demographic. To achieve this, collecting data over an extended period of time and using an internet based platform to distribute online surveys would be recommended. This would be beneficial when repeating the study as opinions are likely to change throughout the course of a Formula One season,

which could create a different overall picture than the 'snapshot' for the purposes of this study. It would also be appropriate, when conducting further research on this topic area, to incorporate a question to investigate the influence of when live races are aired, which could have a significant effect on peoples viewing behaviours

5.4 Summary

Overall, the null hypothesis for this study is accepted as the majority of respondents asked did not favour modifying certain Grand Prix aspects;

H₀ – Formula One fans are not in favour of modifying current aspects of a Grand Prix race to enhance viewing entertainment.

However, when considered in terms of individual gender, the null hypothesis can be rejected in favour of the alternative hypothesis for females. It can be determined that females are less satisfied with the current entertainment value provided by a Formula One race and show a preference towards modification of current aspects of Grand Prix races.

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Appendices

Appendix A – Copy of Questionnaire



Dear Sir/Madam

I am currently undertaking study towards a BSc Honours Degree in Motorsport Management at the University of Wales Trinity Saint David, Swansea. In order to complete my dissertation I am required to research my chosen topic area, the focus of this being which elements of Formula One races could be modified to enhance viewer entertainment and fan viewing behaviours. The purpose of this study is to collate and analyse a variety of perspectives so that conclusions may be drawn and the appropriate recommendations made.

I would be very grateful if you could spare a few minutes of your time to complete this survey. All data collected will remain fully anonymous and will strictly be used for the purpose of my dissertation only. Please tick or highlight your appropriate choice from the following questions.

1. Do you watch Formula One? (If Yes, please proceed to question 2)

- ☐ Yes
- ☐ No

2. What is your gender?

- ☐ Male
- ☐ Female
- ☐ Prefer not to say

3. What is your age?

- ☐ Under 18
- ☐ 18-30
- ☐ 31-40
- ☐ 41-50
- ☐ 51-60
- ☐ Over 60

4. Which ONE of the following methods do you most commonly use to watch Formula One races? (please select one option only)

- ☐ Live TV coverage
- ☐ Live streaming to device (Phone/tablet/laptop/PC)
- ☐ Recorded/catch up TV
- ☐ Highlights

5. During a typical Formula One season (20 races) how many races do you usually watch?

- ☐ Under 5
- ☐ 5-10
- ☐ 11-15
- ☐ 16+

6. Do you or your household currently pay a subscription to exclusively watch Formula One races?

- ☐ Already included in TV package
- ☐ Yes
- ☐ No

7. Please choose from the following list the THREE options that you consider to be the most exciting aspects of watching a Formula One race?

- ☐ Overtaking
- ☐ Technological innovations
- ☐ Speed and performance of cars
- ☐ Risks and potential drama for high speed crashes
- ☐ Intense championship battles and driver rivalries
- ☐ Supporting a certain driver or team
- ☐ Start of the race/opening laps
- ☐ Pit stops
- ☐ Other, please specify; _____

8. Which ONE of the following best describes your viewing habits when watching a LIVE Formula One race? (please select one option only)

- ☐ Watch the entire race duration from start to finish
- ☐ Watch various parts of the race, but not the entire race
- ☐ Watch the opening and closing laps
- ☐ Watch highlights only
- ☐ Use of interactive viewing facilities to pause/fast forward parts of the race

Please select the response that best matches your personal opinion in relation to the following statements; (If you do not feel able to comment on a particular statement, please leave blank)

9. 'Modern Formula One races are a 'procession' rather than a race'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

10. 'Formula One racing would be more entertaining for viewers if there was less reliability on the technological innovation of cars (e.g. aerodynamics) and more reliance on driver skill'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

11. 'Driver aids such as; Drag Reduction System (DRS) and Kinetic Energy Recovery System (KERS) have had a positive impact in terms of making racing more competitive'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

12. 'Reducing the top speed of Formula One cars will result in more competitive and entertaining racing'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

13. 'Re-introduction of midrace re-fuelling will greatly enhance viewer entertainment'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

14. 'Changing current race format e.g. introducing a multiple race format of decreased race durations over a Grand Prix weekend will enhance viewer entertainment'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

15. 'It is important to consider the history and heritage of Formula One when implementing changes to the sport'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

16. 'Formula One is over regulated'

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

17. Would you favour the introduction of artificial methods, such as sprinkler systems to provide more entertaining racing?

- ☐ Yes
- ☐ No

Thank you for your participation!

Please email completed questionnaires or feedback about this survey to:

Luke_atherton1989@hotmail.com

Appendix B - SPSS Test Results

4.7 - Chi-Square test for Gender (Q2) and viewing habits when watching a live Formula One race (Q8)

Gender * Viewing habits watching LIVE race Crosstabulation						
			Viewing habits watching LIVE race			Total
			Watch entire race start to finish	Watch various parts of race	Watch highlights only	
Gender	Male	Count	44	38	10	92
		Expected Count	36.7	46.0	9.3	92.0
		% within Gender	47.8%	41.3%	10.9%	100.0%
		% within Viewing habits watching LIVE race	86.3%	59.4%	76.9%	71.9%
	Female	Count	7	26	3	36
		Expected Count	14.3	18.0	3.7	36.0
		% within Gender	19.4%	72.2%	8.3%	100.0%
		% within Viewing habits watching LIVE race	13.7%	40.6%	23.1%	28.1%
Total	Count	51	64	13	128	
	Expected Count	51.0	64.0	13.0	128.0	
	% within Gender	39.8%	50.0%	10.2%	100.0%	
	% within Viewing habits watching LIVE race	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests			
	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	10.342 ^a	2	.006
Likelihood Ratio	10.798	2	.005
Linear-by-Linear Association	1.820	1	.177
N of Valid Cases	128		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.66.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.284	.006
	Cramer's V	.284	.006
N of Valid Cases		128	

4.8 - Chi-Square test for Age (Q3) and method used to watch a live Formula One Race (Q4)

AgeGrouped3 * Watch Method Crosstabulation							
			Watch Method				Total
			Live tv coverage	Live streaming to device	Recorded/catchup tv	Highlights	
AgeGrouped3	30 or under	Count	16	27	14	12	69
		Expected Count	25.9	19.9	11.3	11.9	69.0
		% within AgeGrouped3	23.2%	39.1%	20.3%	17.4%	100.0%
		% within Watch Method	33.3%	73.0%	66.7%	54.5%	53.9%
	31-50	Count	21	10	6	4	41
		Expected Count	15.4	11.9	6.7	7.0	41.0
		% within AgeGrouped3	51.2%	24.4%	14.6%	9.8%	100.0%
		% within Watch Method	43.8%	27.0%	28.6%	18.2%	32.0%
	51+	Count	11	0	1	6	18
		Expected Count	6.8	5.2	3.0	3.1	18.0
		% within AgeGrouped3	61.1%	0.0%	5.6%	33.3%	100.0%
		% within Watch Method	22.9%	0.0%	4.8%	27.3%	14.1%
Total	Count	48	37	21	22	128	
	Expected Count	48.0	37.0	21.0	22.0	128.0	
	% within AgeGrouped3	37.5%	28.9%	16.4%	17.2%	100.0%	
	% within Watch Method	100.0%	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.544 ^a	6	.001
Likelihood Ratio	27.525	6	.000
Linear-by-Linear Association	2.153	1	.142
N of Valid Cases	128		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 2.95.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.420	.001
	Cramer's V	.297	.001
N of Valid Cases		128	

4.10 - Chi-Square for Gender (Q2) and overtaking (Q7a)

Gender * Overtaking Crosstabulation					
			Overtaking		Total
			Top Three (Yes)	Top Three (No)	
Gender	Male	Count	70	22	92
		Expected Count	65.4	26.6	92.0
		% within Gender	76.1%	23.9%	100.0%
		% within Overtaking	76.9%	59.5%	71.9%
	Female	Count	21	15	36
		Expected Count	25.6	10.4	36.0
		% within Gender	58.3%	41.7%	100.0%
		% within Overtaking	23.1%	40.5%	28.1%
Total	Count		91	37	128
	Expected Count		91.0	37.0	128.0
	% within Gender		71.1%	28.9%	100.0%
	% within Overtaking		100.0%	100.0%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.969 ^a	1	.046	.054	.040	
Continuity Correction ^b	3.152	1	.076			
Likelihood Ratio	3.820	1	.051	.082	.040	
Fisher's Exact Test				.054	.040	
Linear-by-Linear Association	3.938 ^c	1	.047	.054	.040	.025
N of Valid Cases	128					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.41.

b. Computed only for a 2x2 table

c. The standardized statistic is 1.984.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.176	.046	.054
	Cramer's V	.176	.046	.054
N of Valid Cases		128		

4.11 - Chi-Square for Gender (Q2) and supporting a certain team or driver (Q7f)

Gender * Supporting certain team or driver Crosstabulation					
			Supporting certain team or driver		Total
			Top Three (Yes)	Top Three (No)	
Gender	Male	Count	9	83	92
		Expected Count	20.1	71.9	92.0
		% within Gender	9.8%	90.2%	100.0%
		% within Supporting certain team or driver	32.1%	83.0%	71.9%
	Female	Count	19	17	36
		Expected Count	7.9	28.1	36.0
		% within Gender	52.8%	47.2%	100.0%
		% within Supporting certain team or driver	67.9%	17.0%	28.1%
Total	Count		28	100	128
	Expected Count		28.0	100.0	128.0
	% within Gender		21.9%	78.1%	100.0%
	% within Supporting certain team or driver		100.0%	100.0%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	27.989 ^a	1	.000	.000	.000	
Continuity Correction ^b	25.529	1	.000			
Likelihood Ratio	25.755	1	.000	.000	.000	
Fisher's Exact Test				.000	.000	
Linear-by-Linear Association	27.770 ^c	1	.000	.000	.000	.000
N of Valid Cases	128					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.88.

b. Computed only for a 2x2 table

c. The standardized statistic is -5.270.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-.468	.000	.000
	Cramer's V	.468	.000	.000
N of Valid Cases		128		

4.12 - Chi-Square for Gender (Q2) and pit stops (Q7h)

Gender * Pitstops Crosstabulation					
			Pitstops		Total
			Top Three (Yes)	Top Three (No)	
Gender	Male	Count	9	83	92
		Expected Count	15.1	76.9	92.0
		% within Gender	9.8%	90.2%	100.0%
		% within Pitstops	42.9%	77.6%	71.9%
	Female	Count	12	24	36
		Expected Count	5.9	30.1	36.0
		% within Gender	33.3%	66.7%	100.0%
		% within Pitstops	57.1%	22.4%	28.1%
Total		Count	21	107	128
		Expected Count	21.0	107.0	128.0
		% within Gender	16.4%	83.6%	100.0%
		% within Pitstops	100.0%	100.0%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.464 ^a	1	.001	.002	.002	
Continuity Correction ^b	8.817	1	.003			
Likelihood Ratio	9.504	1	.002	.003	.002	
Fisher's Exact Test				.003	.002	
Linear-by-Linear Association	10.382 ^c	1	.001	.002	.002	.002
N of Valid Cases	128					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.91.

b. Computed only for a 2x2 table

c. The standardized statistic is -3.222.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-.286	.001	.002
	Cramer's V	.286	.001	.002
N of Valid Cases		128		

4.13 - Chi-Square for Age (Q3) and technological innovations (Q7b)

AgeGrouped3 * Technological innovations Crosstabulation					
			Technological innovations		Total
			Top Three (Yes)	Top Three (No)	
AgeGrouped3	30 or under	Count	4	65	69
		Expected Count	8.6	60.4	69.0
		% within AgeGrouped3	5.8%	94.2%	100.0%
		% within Technological innovations	25.0%	58.0%	53.9%
	31-50	Count	7	34	41
		Expected Count	5.1	35.9	41.0
		% within AgeGrouped3	17.1%	82.9%	100.0%
		% within Technological innovations	43.8%	30.4%	32.0%
	51+	Count	5	13	18
		Expected Count	2.3	15.8	18.0
		% within AgeGrouped3	27.8%	72.2%	100.0%
		% within Technological innovations	31.3%	11.6%	14.1%
Total	Count	16	112	128	
	Expected Count	16.0	112.0	128.0	
	% within AgeGrouped3	12.5%	87.5%	100.0%	
	% within Technological innovations	100.0%	100.0%	100.0%	

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.460 ^a	2	.024	.027		
Likelihood Ratio	7.159	2	.028	.036		
Fisher's Exact Test	7.422			.020		
Linear-by-Linear Association	7.400 ^b	1	.007	.009	.007	.005
N of Valid Cases	128					

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 2.25.

b. The standardized statistic is -2.720.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.241	.024	.027
	Cramer's V	.241	.024	.027
N of Valid Cases		128		

4.14 - Chi-Square for Age (Q3) and speed and performance of cars (Q7c)

AgeGrouped3 * Speed and performance Crosstabulation					
			Speed and performance		Total
			Top Three (Yes)	Top Three (No)	
AgeGrouped3	30 or under	Count	7	62	69
		Expected Count	14.0	55.0	69.0
		% within AgeGrouped3	10.1%	89.9%	100.0%
		% within Speed and performance	26.9%	60.8%	53.9%
	31-50	Count	13	28	41
		Expected Count	8.3	32.7	41.0
		% within AgeGrouped3	31.7%	68.3%	100.0%
		% within Speed and performance	50.0%	27.5%	32.0%
	51+	Count	6	12	18
		Expected Count	3.7	14.3	18.0
		% within AgeGrouped3	33.3%	66.7%	100.0%
		% within Speed and performance	23.1%	11.8%	14.1%
Total	Count	26	102	128	
	Expected Count	26.0	102.0	128.0	
	% within AgeGrouped3	20.3%	79.7%	100.0%	
	% within Speed and performance	100.0%	100.0%	100.0%	

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.581 ^a	2	.008	.009		
Likelihood Ratio	9.770	2	.008	.011		
Fisher's Exact Test	9.868			.006		
Linear-by-Linear Association	8.053 ^b	1	.005	.006	.004	.003
N of Valid Cases	128					

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.66.

b. The standardized statistic is -2.838.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.274	.008	.009
	Cramer's V	.274	.008	.009
N of Valid Cases		128		

4.15 - Chi-Square for Age (Q3) and risks and potential drama for high speed crashes Q7d

AgeGrouped3 * Risks/high speed crashes Crosstabulation					
			Risks/high speed crashes		Total
			Top Three (Yes)	Top Three (No)	
AgeGrouped3	30 or under	Count	38	31	69
		Expected Count	29.6	39.4	69.0
		% within AgeGrouped3	55.1%	44.9%	100.0%
		% within Risks/high speed crashes	69.1%	42.5%	53.9%
	31-50	Count	15	26	41
		Expected Count	17.6	23.4	41.0
		% within AgeGrouped3	36.6%	63.4%	100.0%
		% within Risks/high speed crashes	27.3%	35.6%	32.0%
	51+	Count	2	16	18
		Expected Count	7.7	10.3	18.0
		% within AgeGrouped3	11.1%	88.9%	100.0%
		% within Risks/high speed crashes	3.6%	21.9%	14.1%
Total	Count	55	73	128	
	Expected Count	55.0	73.0	128.0	
	% within AgeGrouped3	43.0%	57.0%	100.0%	
	% within Risks/high speed crashes	100.0%	100.0%	100.0%	

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.261 ^a	2	.002	.002		
Likelihood Ratio	13.555	2	.001	.001		
Fisher's Exact Test	12.702			.002		
Linear-by-Linear Association	12.048 ^b	1	.001	.000	.000	.000
N of Valid Cases	128					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.73.

b. The standardized statistic is 3.471.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.310	.002	.002
	Cramer's V	.310	.002	.002
N of Valid Cases		128		

4.17 - Chi-Square test for Gender (Q2) and technological innovation versus driver skill (Q10)

Gender * TechInnovationVsDriverSkillGrouped Crosstabulation					
			TechInnovationVsDriverSkillGrouped		Total
			Agree	Disagree	
Gender	Male	Count	58	33	91
		Expected Count	65.2	25.8	91.0
		% within Gender	63.7%	36.3%	100.0%
		% within TechInnovationVsDriverSkillGrouped	63.7%	91.7%	71.7%
	Female	Count	33	3	36
		Expected Count	25.8	10.2	36.0
		% within Gender	91.7%	8.3%	100.0%
		% within TechInnovationVsDriverSkillGrouped	36.3%	8.3%	28.3%
Total		Count	91	36	127
		Expected Count	91.0	36.0	127.0
		% within Gender	71.7%	28.3%	100.0%
		% within TechInnovationVsDriverSkillGrouped	100.0%	100.0%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.907 ^a	1	.002	.002	.001	
Continuity Correction ^b	8.580	1	.003			
Likelihood Ratio	11.586	1	.001	.001	.001	
Fisher's Exact Test				.002	.001	
Linear-by-Linear Association	9.829 ^c	1	.002	.002	.001	.001
N of Valid Cases	127					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.20.

b. Computed only for a 2x2 table

c. The standardized statistic is -3.135.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-.279	.002	.002
	Cramer's V	.279	.002	.002
N of Valid Cases		127		

4.18 - Chi-Square test for Gender (Q2) and re-introduction of midrace refuelling to enhance viewer entertainment (Q13)

Gender * RefuellingGrouped Crosstabulation					
			RefuellingGrouped		Total
			Agree	Disagree	
Gender	Male	Count	63	29	92
		Expected Count	69.0	23.0	92.0
		% within Gender	68.5%	31.5%	100.0%
		% within RefuellingGrouped	65.6%	90.6%	71.9%
	Female	Count	33	3	36
		Expected Count	27.0	9.0	36.0
		% within Gender	91.7%	8.3%	100.0%
		% within RefuellingGrouped	34.4%	9.4%	28.1%
Total	Count	96	32	128	
	Expected Count	96.0	32.0	128.0	
	% within Gender	75.0%	25.0%	100.0%	
	% within RefuellingGrouped	100.0%	100.0%	100.0%	

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.420 ^a	1	.006	.011	.004	
Continuity Correction ^b	6.235	1	.013			
Likelihood Ratio	8.635	1	.003	.006	.004	
Fisher's Exact Test				.006	.004	
Linear-by-Linear Association	7.362 ^c	1	.007	.011	.004	.003
N of Valid Cases	128					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.00.

b. Computed only for a 2x2 table

c. The standardized statistic is -2.713.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-.241	.006	.011
	Cramer's V	.241	.006	.011
N of Valid Cases		128		

4.19 - Chi-Square test for Gender (Q2) and over regulation of Formula One (Q16)

Gender * OverRegulatedGrouped Crosstabulation					
			OverRegulatedGrouped		Total
			Agree	Disagree	
Gender	Male	Count	67	24	91
		Expected Count	71.9	19.1	91.0
		% within Gender	73.6%	26.4%	100.0%
		% within OverRegulatedGrouped	68.4%	92.3%	73.4%
	Female	Count	31	2	33
		Expected Count	26.1	6.9	33.0
		% within Gender	93.9%	6.1%	100.0%
		% within OverRegulatedGrouped	31.6%	7.7%	26.6%
Total	Count		98	26	124
	Expected Count		98.0	26.0	124.0
	% within Gender		79.0%	21.0%	100.0%
	% within OverRegulatedGrouped		100.0%	100.0%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.030 ^a	1	.014	.023	.009	
Continuity Correction ^b	4.867	1	.027			
Likelihood Ratio	7.264	1	.007	.013	.009	
Fisher's Exact Test				.013	.009	
Linear-by-Linear Association	5.981 ^c	1	.014	.023	.009	.008
N of Valid Cases	124					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.92.

b. Computed only for a 2x2 table

c. The standardized statistic is -2.446.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-.221	.014	.023
	Cramer's V	.221	.014	.023
N of Valid Cases		124		

4.20 - Chi-Square for Gender (Q2) and favouring the introduction of artificial methods to provide more entertaining racing (Q17)

Gender * Artificial methods Crosstabulation

			Artificial methods		Total
			Yes	No	
Gender	Male	Count	23	69	92
		Expected Count	33.1	58.9	92.0
		% within Gender	25.0%	75.0%	100.0%
		% within Artificial methods	50.0%	84.1%	71.9%
	Female	Count	23	13	36
		Expected Count	12.9	23.1	36.0
		% within Gender	63.9%	36.1%	100.0%
		% within Artificial methods	50.0%	15.9%	28.1%
Total	Count		46	82	128
	Expected Count		46.0	82.0	128.0
	% within Gender		35.9%	64.1%	100.0%
	% within Artificial methods		100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	16.997 ^a	1	.000	.000	.000
Continuity Correction ^b	15.350	1	.000		
Likelihood Ratio	16.621	1	.000		
Fisher's Exact Test					
Linear-by-Linear Association	16.864	1	.000		
N of Valid Cases	128				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.94.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.364	.000
	Cramer's V	.364	.000
N of Valid Cases		128	

4.21 - Chi-Square test for Age (Q3) and the positive impact of driver aids on making racing more competitive (Q11)

AgeGrouped3 * DriverAidsGrouped Crosstabulation					
			DriverAidsGrouped		Total
			Agree	Disagree	
AgeGrouped3	30 or under	Count	58	5	63
		Expected Count	51.5	11.6	63.0
		% within AgeGrouped3	92.1%	7.9%	100.0%
		% within DriverAidsGrouped	59.2%	22.7%	52.5%
	31-50	Count	28	12	40
		Expected Count	32.7	7.3	40.0
		% within AgeGrouped3	70.0%	30.0%	100.0%
		% within DriverAidsGrouped	28.6%	54.5%	33.3%
	51+	Count	12	5	17
		Expected Count	13.9	3.1	17.0
		% within AgeGrouped3	70.6%	29.4%	100.0%
		% within DriverAidsGrouped	12.2%	22.7%	14.2%
Total	Count	98	22	120	
	Expected Count	98.0	22.0	120.0	
	% within AgeGrouped3	81.7%	18.3%	100.0%	
	% within DriverAidsGrouped	100.0%	100.0%	100.0%	

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.578 ^a	2	.008	.009		
Likelihood Ratio	9.943	2	.007	.009		
Fisher's Exact Test	9.970			.005		
Linear-by-Linear Association	7.553 ^b	1	.006	.008	.006	.004
N of Valid Cases	120					

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.12.

b. The standardized statistic is 2.748.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.364	.000
	Cramer's V	.364	.000
N of Valid Cases		128	

4.22 - Chi-Square test for Age (Q3) and changing race format (multiple race format, decreased race duration) over a Grand Prix weekend to enhance viewer entertainment (Q14)

AgeGrouped3 * ChangingRaceFormatGrouped Crosstabulation					
			ChangingRaceFormatGrouped		Total
			Agree	Disagree	
AgeGrouped3	30 or under	Count	42	26	68
		Expected Count	31.6	36.4	68.0
		% within AgeGrouped3	61.8%	38.2%	100.0%
		% within ChangingRaceFormatGrouped	71.2%	38.2%	53.5%
	31-50	Count	13	28	41
		Expected Count	19.0	22.0	41.0
		% within AgeGrouped3	31.7%	68.3%	100.0%
		% within ChangingRaceFormatGrouped	22.0%	41.2%	32.3%
	51+	Count	4	14	18
		Expected Count	8.4	9.6	18.0
		% within AgeGrouped3	22.2%	77.8%	100.0%
		% within ChangingRaceFormatGrouped	6.8%	20.6%	14.2%
Total	Count	59	68	127	
	Expected Count	59.0	68.0	127.0	
	% within AgeGrouped3	46.5%	53.5%	100.0%	
	% within ChangingRaceFormatGrouped	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	14.242 ^a	2	.001	.001		
Likelihood Ratio	14.663	2	.001	.001		
Fisher's Exact Test	14.171			.001		
Linear-by-Linear Association	13.124 ^b	1	.000	.000	.000	.000
N of Valid Cases	127					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.36.

b. The standardized statistic is 3.623.

Symmetric Measures

		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.335	.001	.001
	Cramer's V	.335	.001	.001
N of Valid Cases		127		

4.23- Chi-Square for Gender (Q2) and changing race format (multiple race format, decreased race duration) over a Grand Prix weekend to enhance viewer entertainment (Q14)

Gender * ChangingRaceFormatGrouped Crosstabulation					
			ChangingRaceFormatGrouped		Total
			Agree	Disagree	
Gender	Male	Count	33	59	92
		Expected Count	42.7	49.3	92.0
		% within Gender	35.9%	64.1%	100.0%
		% within ChangingRaceFormatGrouped	55.9%	86.8%	72.4%
	Female	Count	26	9	35
		Expected Count	16.3	18.7	35.0
		% within Gender	74.3%	25.7%	100.0%
		% within ChangingRaceFormatGrouped	44.1%	13.2%	27.6%
Total	Count		59	68	127
	Expected Count		59.0	68.0	127.0
	% within Gender		46.5%	53.5%	100.0%
	% within ChangingRaceFormatGrouped		100.0%	100.0%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	15.043 ^a	1	.000	.000	.000	
Continuity Correction ^b	13.538	1	.000			
Likelihood Ratio	15.428	1	.000	.000	.000	
Fisher's Exact Test				.000	.000	
Linear-by-Linear Association	14.924 ^c	1	.000	.000	.000	.000
N of Valid Cases	127					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.26.

b. Computed only for a 2x2 table

c. The standardized statistic is -3.863.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	-.344	.000	.000
	Cramer's V	.344	.000	.000
N of Valid Cases		127		

4.24 Chi-Square for Age (Q3) and favouring the introduction of artificial methods to provide more entertaining racing (Q17)

AgeGrouped3 * Artificial methods Crosstabulation					
			Artificial methods		Total
			Yes	No	
AgeGrouped3	30 or under	Count	36	33	69
		Expected Count	24.8	44.2	69.0
		% within AgeGrouped3	52.2%	47.8%	100.0%
		% within Artificial methods	78.3%	40.2%	53.9%
	31-50	Count	8	33	41
		Expected Count	14.7	26.3	41.0
		% within AgeGrouped3	19.5%	80.5%	100.0%
		% within Artificial methods	17.4%	40.2%	32.0%
	51+	Count	2	16	18
		Expected Count	6.5	11.5	18.0
		% within AgeGrouped3	11.1%	88.9%	100.0%
		% within Artificial methods	4.3%	19.5%	14.1%
Total	Count	46	82	128	
	Expected Count	46.0	82.0	128.0	
	% within AgeGrouped3	35.9%	64.1%	100.0%	
	% within Artificial methods	100.0%	100.0%	100.0%	

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	17.524 ^a	2	.000	.000		
Likelihood Ratio	18.629	2	.000	.000		
Fisher's Exact Test	17.589			.000		
Linear-by-Linear Association	15.874 ^b	1	.000	.000	.000	.000
N of Valid Cases	128					

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.47.

b. The standardized statistic is 3.984.

Symmetric Measures				
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.370	.000	.000
	Cramer's V	.370	.000	.000
N of Valid Cases		128		