Strategies to Improve the Effectiveness

of Incident Commanders at Structure Fires

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# Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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#### Abstract

Incident commanders at structure fires have an enormous amount of responsibility. The incident commanders within the Myrtle Beach Fire Department (MBFD) are often overtaxed and placed in a setting that can adversely affect their critical thinking and decision making abilities on structure fires. This research was intended to identify strategies that will aid the incident commander with the ability to increase their focus and effectiveness at structure fires. The descriptive research method was used to evaluate three research questions. The three questions answered were how external distractions affect focus and performance, what steps other fire departments have taken to assist incident commanders with increasing their effectiveness on structure fires, and how the MBFD command officers viewed the department's current ICS practices on structure fires. The research methods included creating and administering a focus and performance assessment while various distractions were introduced and conducting personal interviews. The MBFD command officers were surveyed regarding the command practices within the MBFD and fire departments from across the United States were surveyed concerning the steps they have taken to improve their incident commanders' effectiveness. Finally, MBFD structure fire footage was reviewed and a noise test was administered measuring the noise level inside the command vehicle. The results revealed that stress and distractions can decrease performance levels, adding additional incident command support betters the overall command and control process, and the MBFD command officers share a similar view of the department's command practices. The recommendations included standardizing the MBFD incident command practices, providing additional training for MBFD personnel and utilizing the command staff to deliver the training, adding an additional command officer on structure fires, and making the incident command post a sterile environment.

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#### Introduction

The incident command system (ICS) is an organizational tool to aid in the management of emergencies and the National Fire Protection Association's (NFPA) *Standard on Fire Department Occupational Safety and Health Program* requires it to be used on all emergency incidents (National Fire Protection Association, 2013). The ICS was developed from the wildfires in California in the 1970's, and is still used in the fire service today. Like most things in the fire service, it has been tweaked over the years with professional advances and changing technologies, but the basic structure and reasoning for it remains the same. It is viewed as so important to managing an emergency that Homeland Security Presidential Directive #5 requires that it be used and adopted by all public safety agencies (Department of Homeland Security, 2008).

The ICS is one of the three key elements within the National Incident Management System (NIMS) and provides for a "flexible core mechanism for coordinated and collaborative incident management" (Department of Homeland Security, 2008). The events of the 2004 and 2005 hurricane seasons, as well as the terrorist attacks on September 11, 2001, illustrated the need for improvement within emergency management. The federal government developed NIMS along with the National Response Framework (NRF), and adopted ICS as the incident management system (Department of Homeland Security, 2008). The NRF is a guide on how the nation responds to all hazards (Department of Homeland Security, 2008) and the NIMS is the template for how to manage the incident (Department of Homeland Security, 2008). However, no matter how good the incident management structure is on paper, it is the individuals that actually fill the positions and make the decisions which dictate the outcome of an incident. In accordance with the federal mandate, the City of Myrtle Beach is a NIMS compliant agency. All required City departments and personnel have met the standards for NIMS compliance including the Myrtle Beach Fire Department (MBFD), which has been using ICS as its incident management system since the late 1980's. The problem is that incident commanders within the MBFD are often overtaxed and placed in a setting that can adversely affect their critical thinking and decision making abilities at structure fires.

The purpose of this research is to identify strategies that will aid the incident commander with the ability to increase their focus and effectiveness at structure fires. The descriptive research method will be used to evaluate three research questions: a) How do external distractions affect focus and performance? b) What steps have other fire departments taken to assist incident commanders with increasing their effectiveness on structure fires? c) How do the MBFD command officers view the department's current ICS practices on structure fires?

# Background and Significance

The City of Myrtle Beach is located on the Atlantic Ocean in northeastern South Carolina. Myrtle Beach is the hub of the Grand Strand, a name given to the area for the 60 miles of uninterrupted coastline (City of Myrtle Beach, 2012, p. v). According to the 2010 United States Census, the City of Myrtle Beach has 27,109 year round residents (United States Census Bureau, 2010) and an average daily population of 110,000 according to the City's Public Information Officer (M. Kurea, personal communication, May 25, 2013). This is a population increase of over 50% since 1980 (City of Myrtle Beach, 2012, p. vi), even after the loss of thousands of people when the Myrtle Beach Air Force Base closed in 1993.

The City of Myrtle Beach is a popular tourist destination that has been receiving national recognition. In 2012, Myrtle Beach was named Tripadvisor's "#3 Best Beach in the United

States" and *US News and World Report's* "#6 Best Family Beach" (Myrtle Beach Area Chamber of Commerce, 2013). The national attention has increased visitors, with 14.5 million people vacationing in Myrtle Beach in 2011 (Myrtle Beach Area Chamber of Commerce, 2013).

The City of Myrtle Beach continues to grow with a large amount of families relocating and people retiring. Myrtle Beach was recognized as one of the "Top 15 Low-Cost Towns" to retire in by *Where to Retire* magazine. In April of 2012, the Myrtle Beach Metropolitan Statistical Area was once again listed in the top ten of fastest growing metropolitan areas in the Unites States (Myrtle Beach Area Chamber of Commerce, 2013) and the City estimates another 4,500 new homes will be added during 2013 (B. L. Arnel, personal communication, May 1, 2013).

Certainly with the increase in people and increase in homes, there is a high likelihood that structure fires will increase. Even with the advances in fire protection and fire detection systems, the human element cannot be totally eliminated. Because of this, the MBFD must be prepared to tackle this increased challenge.

The MBFD was established on October 14, 1936, as a volunteer organization with a paid Fire Chief. Through the years career personnel were added to supplement the volunteers and eventually the department transitioned to all career staffing (B. L. Arnel, personal communication, May 1, 2013). In 1987 the department had 12 employees per shift, based out of three stations, with one shift captain serving as the command officer and being in charge of the shift. The department only responded to fire calls. Now, the MBFD is an all hazards emergency service delivery organization. The department responds to fires, medical emergencies, hazardous material releases, and technical rescue incidents. The MBFD has to juggle protecting nearly 15 million people annually within a community of fewer than 28,000 residents.

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The department currently consists of 159 fulltime employees and one part-time employee. The Emergency Services Division handles responding to emergency calls and is divided into three shifts with 48 personnel assigned to each shift, working a 24-hours on duty, 48-hours off duty schedule. Each shift is led by a Battalion Chief that also serves as the incident commander (IC) on structure fires and other large scale emergencies who reports to the Assistant Chief. There are nine Lieutenants and one Captain on each shift, with the remainder of personnel being Engineers, also called driver-operators, and Firefighters.

The MBFD operates five engines, two trucks, one heavy rescue, one quint, two medium duty rescues, two ambulances, one medical quick response squad, and a command vehicle out of six stations with a minimum daily staffing of 36. The engines, quint, and heavy rescue are staffed with three personnel, and the Captain rides the heavy rescue. The trucks and all other units, except for the command vehicle, have a minimum of two personnel. The ambulances, medium rescues, and squad all also referred to as support service companies. The command vehicle is staffed by the shift Battalion Chief.

The background on the problem is that over the years the department has not kept pace with the advances and improvements in incident management. The MBFD has twice as many emergency service personnel, twice as many apparatus, twice as many stations, and responds to three times as many incidents as it did 20 years ago, but there is still just one person overseeing the shift. This puts a tremendous burden on the Battalion Chief, both daily as an administrator and on emergency incidents as an IC.

On an initial first alarm assignment for a residential structure fire two engines, one truck, one heavy rescue, three support service companies, and the Battalion Chief are dispatched. From the initial dispatch the IC is already outside of the optimal span of control limit. The span of control is the number of people one individual can supervise effectively, usually three to seven, but NIMS states the optimum is five (Department of Homeland Security, 2008). On a first alarm assignment for a commercial structure fire an additional support service company is sent, which places the IC outside the span of control altogether. According to Emery (2007), maintaining span of control is "the key that will open the door to competent incident management" (Emery, 2007).

There are other distractions that affect a MBFD incident commander's ability to focus on the incident at hand. While the IC is managing the incident, they are also responsible for setting up the video camera in the command vehicle to capture film of the incident. There is one mounted on the dash, and another in the back of the command vehicle with 50 feet of cable that the IC is supposed to suction cup onto a closer unit to capture a better video. Also, the IC is required to collect the accountability cards and place them on the accountability board, document the company's assignments on a magnetic command board, set up the portable receiver that is hooked to a monitor at the rear of the command vehicle that will receive a video feed from a thermal imagining camera that is inside the structure and monitor the progress of the interior crews, notify the dispatch center to move companies to maintain coverage in the city, and notify the administrative staff of the incident. The notification usually results in phone calls from offduty chief officers wanting to know what is happening.

Not only are there tasks that can hurt the incident commander's ability to focus on the incident, there are external distractions such as the weather, lighting, noise, and just the stress of the incident that can overwhelm an IC. Captain Eric Nurnberg of the Iowa City, Iowa, Fire Department says that the fire service fails to understand the reality of the environment in which incident commanders are placed. "The fireground is full of pervasive uncertainties, unknowns,

and chaos. This is the foundation of warfare, and the fire service under appreciates that, so we allow the IC to become overwhelmed" (E. Nurnberg, personal communication, July 3, 2013).

There have been several incidents over the past two years where incident commanders have been overwhelmed and they have been placed in less than ideal situations. Two incidents have even resulted in maydays being called. One occurred on the eight floor at residential highrise fire when a rescue crew became completely lost in zero visibility due to smoke. There was no assistance at the incident command post (ICP) to aid the IC in managing the mayday and running the incident. Six months later there was another mayday when a crewmember on the fire attack hose lost his breathing air from his self-contained breathing apparatus in a large beach house fire.

There have been three recent multi-alarm fires where the IC had to manage the entire incident without any assistance. At a two-alarm fire in 5,000 square foot single-family residence in May 2013, the IC had to handle all aspects of the ICS. Another fire occurred at a beach house where all MBFD units were eventually sent. The Battalion Chief was on vacation so the captain was riding the command vehicle. The Captain said he was overwhelmed and had no ICS support. The final recent example was another fire that required every unit in the city to respond. It was a two-story, ordinary construction, restaurant in a strip mall. The notification to the administrative chiefs did not go through when the IC requested it three times, therefore the IC was managing the incident and all of the ICS functions without any assistance.

The significance of not providing an environment that is conducive to sound decision making practices and continuing to inundate the IC may lead to injury or death of a firefighter. There are numerous firefighter line of duty death (LODD) reports that list task saturation of the IC as a contributing factor. This research links to the United States Fire Administration's second goal to "improve local planning and preparedness" (United States Fire Administration, 2010). By being able to increase the incident commander's focus on structure fires, the entire department will benefit operationally by being more effective and efficient, thus being better prepared.

This research also links to unit three on NIMS in the Executive Analysis of Fire Department Operations in Emergency Management (EAFSOEM) course. The NIMS is the method that allows a disaster response plan to be implemented. The Incident Command System is one of the three components of NIMS and "provides a method of effective and efficient management of the disaster response" (National Fire Academy, 2012, p. sm 3-7). It also relates to units seven, 10, and 13 where ICS is used in simulations managing a flood and tornado, earthquake, and hurricane where EAFSOEM students serve as members of an incident management team.

## Literature Review

The initial literature research was conducted on incident command practices within fire service journals at the Learning Resource Center at the National Fire Academy. A search was also conducted on the Internet through various online search engines. A more thorough and expanded literature search was done on focus and decision making to encompass professions outside of the fire service. This search was completed at Kimbel Library on the campus of Coastal Carolina University and the online library database from the University of Cincinnati.

To understand what impacts distractions can have on focus and performance, it is important to understand the basic functions of the brain. The brain is comprised of around 100 billion nerve cells, and contains several times more supporting cells (Dubin, 2002). The nerve cells, which are known as neurons, are similar to any other cell except that neurons have unique components that allow it to communicate with other neurons. This allows for rapid responses from the brain once information is introduced. The neuron has dendrites protruding from the cell body where inputs are received. The inputs then pass through the soma, which is the cell body, down the axon, and end at the synapse (Dubin, 2002). The synapses further break down into about 10,000 smaller terminals called boutons. The boutons attach to around another 1,000 neurons to keep passing the information through the brain. All of this information transfer takes milliseconds (Dubin, 2002). Overall, the brain is made up of nearly 800 named features (Dubin, 2002, p. 12).

The brain uses two different types of processing features to process information. First, parallel processing is the ability of the brain to process more than one input or stimuli at one time. The brain can take multiple stimuli, such as something visual, and be able to process the color, intensity, size, and movement. All of these processes occur in various parts of the brain, but the brain does not prioritize one characteristic over another, rather it processes everything at the same time (Dubin, 2002). Parallel processing is resource intensive using about one-third of the brain, more than any other sensory function (Dubin, 2002). As quickly as this occurs there is between one-quarter to one-half of one second delay. This is due to the time it takes for the information to be processed and moved through the entire nervous system. With this in mind, what people think they are seeing in the present, actually happened roughly one half second ago (Dubin, 2002, p. 41).

Vision can be deceiving in another way as well. According to Hallinan (2009), the eye is not a camera and it does not see everything at once. What the eye can see clearly at normal viewing distances is only the size of a quarter. The eye compensates for this by moving quickly around the viewing field, stopping every few seconds. Because of this not everything that is

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actually present is seen by everyone, and everyone does not always see the same things. Hallinan (2009) uses the example of a crime to illustrate this. When viewing a mock purse theft, men paid more attention to the thief, women paid more attention to the woman holding the purse, and people that were right handed were also more likely to remember the orientation and direction the people were facing.

The other processing feature the brain utilizes is serial processing, which occurs with the sense of hearing. The serial process works the same way as with the visual sensory, however the brain just decodes the various characteristics of the sound, such as the pitch, volume, and location (Dubin, 2002). This process is not as in depth as the visual process and it does not allow for the brain to actually process more than one message, rather just the auditory characteristics of the message. This is what makes carrying on two conversations at the same time difficult.

While the brain is the tool used to process information to help make decisions, there are different decision making models that have been studied over the years. Decision making has been referred to as an art, and the decisions of great leaders have been studied frequently (International Association of Fire Chiefs, 2013). In the early 1900's, the first decision making model was formalized. This model is known as the Rational Choice Model, mostly referred to as Classical Decision Making (CDM) (International Association of Fire Chiefs, 2013). This model can be traced to Benjamin Franklin and Daniel Bernoulli in the mid-1700's (Lipshitz, Klein, Orasanu, & Salas, 2001).

The CDM was used for a long time as the premiere model for making decisions and is still used today in many different environments. The basic foundation for CDM is a set process with several different steps. The first step is to define the problem and identify options or alternatives. After that, the options are characterized. Once they are characterized, they are analyzed, evaluated, and then ranked. After they are ranked, the best option is selected. Finally, the effectiveness of the chosen option is reevaluated (International Association of Fire Chiefs, 2013).

The CDM is a great tool for complex and situations when the decision maker does not need to know why the solution worked. However, the CDM relies heavily on observation and is not effective in crisis situations. When attempting to make a decision in a crisis, the conditions are usually changing, there is uncertainty, insufficient information, and time is of importance (International Association of Fire Chiefs, 2013). Therefore CDM cannot be effectively utilized by fireground incident commanders.

In the 1980's, the United States Army wanted to understand more about how their officers made decisions. The United States Navy also became interested in this after a Navy cruiser accidently shot down an Iranian commercial airplane when it was mistaken for a hostile aircraft (Klein, 2008). Gary Klein was selected to head the research that was sponsored by the Army Research Institute. Klein observed hundreds of decision makers including the military and pilots (International Association of Fire Chiefs, 2013). However, he realized that it would be too dangerous to have researchers follow Army officers in combat situations to study how they made decisions. Instead, Klein elected to study the actions of fireground incident commanders in the Cleveland, Ohio, Fire Department (Gasaway, 2010).

While Klein observed and studied the actions of the Cleveland incident commanders, he also conducted probing interviews. The interviews were conducted with over 30 firefighters with an average of 23 years of experience (Lipshitz et al., 2001). Klein discovered in his study that the Cleveland incident commanders did not establish different options to make decisions, in fact they did not even select two courses of action, and their first option was usually correct.

Thus they were not using the CDM model (Gasaway, 2010). Klein's (2008) study revealed that when confronted with making an important decision under time constraints, people are able to rapidly match the situation to what they have already learned or have experienced. The way Klein (2008) described it, the Cleveland incident commanders were able to match the situation to previous experience and quickly evaluate how their selected course of action would play out. And, if the end result was not what they envisioned, they would simply adapt it. Klein called this process Recognition Primed Decision Making (RPDM).

Recognition Primed Decision Making is a mixture of intuition and analysis. The intuitive portion is being able to match the current situation to something in the brain from experience. The analytic portion is from the mental simulation or models that are conducted of what will happen (Klein, 2008). The RPDM model has four main tenets. Gasaway (2010) states the first is to size-up the situation and to really pay attention to what is happening. The next is to make a diagnosis via the information gained in the size-up and be able to understand what that information means. The third step is to evaluate the course of action by playing a mental simulation and forecasting the outcome. Finally, the decision and course of action is implemented (International Association of Fire Chiefs, 2013).

In order to utilize the RPDM model, the user must be an expert. Lipshitz et al. (2001) state to be able to complete the four steps for RPDM, expertise must be present from experience. There must be expertise and experience to navigate through the RPDM process because if there is no experience to draw from, the brain will not be able to match a suitable solution to the problem (Lipshitz et al.). Also, without experience there are fewer cases to draw from and less practice as well (International Association of Fire Chiefs, 2013).

The brain stores every memory and experience throughout life. Even though a person may not be able to remember a birthday present from 20 years ago, Gasaway (2010) states that under hypnosis people have been taken back to birthday parties when they were very young and been able to recall who was there and the gifts received. Because the brain stores experiences, it is required to possess experience to use RPDM. Once the situation is sized-up, the brain will search for a matching experience and select the proper solution (Gasaway, 2010). In other studies of tank commanders, wildfire commanders, infantry officers, and aviation pilots, RPDM was used in upwards of 95% of the cases in experienced personnel, but less than 50% of the time with inexperience personnel (Lipshitz et al.).

As effective and useful as the RPDM model is at helping to make good decisions, there are distractions on the fireground that can affect an incident commander's focus and decision making ability. The fireground is not an environment that is controlled, static, and always conducive for making good decisions. Most people make important decisions over time and in a place where they can concentrate and think free of interruptions. The fireground is chaotic and constantly changing. The IC does not get enough information on what is happening, or conversely gets too much useless information. Gasaway states (2008) that there is a lot of noise, risk is high, and there is a great deal of unknown. All of these distractions cause stress on the body and mind, and certain defensive responses occur.

Stress can be described as experiences that are "challenging and emotional" (McEwen, 2007). Stress will cause humans to resort back to the primitive actions (Bertomen, 2008) and a human's natural instinct will take over to survive (Gasaway, 2010). McEwen (2007) states this response is caused by the autonomic nervous system's activation of the hypothalamo-pituitary-

adrenal (HPA) axis and has been coined by Walter Canon in the 1920's as the "flight or fight" response (Bertomen, 2008).

In this response, the brain releases two hormones, norepinephrine and epinephrine, to prepare for the stressful event. Epinephrine will increase heart rate and dilate the bronchial tubes in the lungs to allow for more oxygen (McCance, Huether, Brashers, & Rote, 2010, p. 340) and the respiratory rate increases for a more rapid exchange of oxygen (Bertomen, 2008). Bertomen (2008) reports the blood glucose levels rise to create more energy and digestion slows as the brain prioritizes the more important functions. Norepinephrine causes the vessels to constrict and sends blood to the muscles and brain, and the pupils in the eyes dilate to improve vision (McCance et al., 2010, p. 340). Although these hormonal changes allow humans to respond to stress from a primitive, survival vantage point, cognitive function decreases (Menkes, 2011).

Menkes (2011) reports that while the release of epinephrine, also known as adrenalin, allows for things such as increased strength, it serves as a distracter in the brain and hinders the ability to focus on a task. Attention becomes narrowed according to Gasaway (2010), the ability to comprehend complex items becomes low, and humans will revert back to old habits or what feels comfortable. It also affects fine motor function, and this has been documented well in police officers after stressful encounters. In these studies, even though the officer may have been able to use incredible strength or speed, they usually could not write a report or unlock their car using the key afterwards (Bertomen, 2008).

Cortisol is another hormone that is released. Once excessive cortisol is released though, memory begins to diminish. Early on, cortisol attaches to receptors in the hippocampus of the brain to improve memory. However, according to Singer (2012), as the stress continues and the release of cortisol continues, the receptor sites fill up and the opposite reaction occurs and

memory actually decreases. In studies with police officers, their decision making processes have been noted as diminished due to altered perceptions of what was important, and they also suffered memory loss and short periods of false memory (Bertomen, 2008).

While the initial release of hormones are to protect human from a stressful event, the continuation causes major problems. In the initial stages of the stress response, performance increases with the threat level. However, once the stress level becomes too high and the hormone release becomes too great, performance decreases. This is known as the Yerkes-Dodson Curve (Bertomen, 2008). See Appendix A.

A study conducted by Kassam, Koslov, and Mendes (2009) at Harvard University used college students to see if stress affected their performance. The study consisted of 71 females and 32 males. They were given a mock job interview where they had to give a speech and answer questions. Half of the participants were in the group that received negative feedback during the interview, while the others were placed in the group where they received positive feedback. Kassam et al. (2009) discovered that while both groups were placed under stress, the group that received positive feedback adjusted better to the questions than those that received negative feedback. The group that received the negative feedback was not as successful in adjusting to the questions and exhibited cardiovascular responses that were consistent with an increased threat level (Kassam et al.).

Another study that revealed how stress affects performance was conducted at the University of Bielefeld, Germany. Starcke, Wolf, Markowitsch, and Brand (2008) studied 44 students from the university and broke them into two groups. Each group was told they were going to complete several neuropsychological tests and then they were to compare their actual performance with a pre-test self evaluation. After the tests were completed they were to give a speech to a group of psychologists that would question them about their performance. Prior to the tests being administered, the Control Group (CG) was told they would not be questioned nor would they have to give a speech. However, the Experimental Group (EG) was told nothing and remained under the impression they were going to give the speech and be questioned (Starcke et al.).

The results demonstrated that the EG had higher levels of anxiety and higher negative affect scores than the CG. This was equated with the added dimension of stress the EG had. On the decision making test, The Game of Dice Tasks was used, the EG had significantly lower scores than the CG. The main result of the study reveals that stress can affect performance and decision making (Starcke et al., 2008).

Police officers work in environments of stress and chaos, and they have to make life and death decisions similar to fireground incident commanders. When studied, the outcomes of decisions made by police officer appear to be affected adversely by stress. Nieuwenhuys, Savelsbergh, and Oudejans (2012) of the VU University Amsterdam in The Netherlands conducted a study on how police officers react when stressed and anxious. The study used 36 experienced officers with nearly 15 years on the job. The median age of the officers was 37.79 years.

The study was conducted with the use of an Applied Interactive Systems video environment simulator. The participants were broken into two groups, low anxiety (LA) and high anxiety (HA). The video simulator had two windows on a screen. A suspect would appear in one of the windows, sometimes with a gun in hand, other times with no gun. If the suspect had a gun, the officer was to fire at the suspect. There was also a shoot back canon that would fire rubber bullets at the officer when the suspect had the gun drawn and the officer did not fire quickly enough. This condition was in the HA group only. The LA group had no shoot back feature (Nieuwenhuys et al., 2012).

The results from Nieuwenhuys et al. (2012) showed that the officers in the HA group shot the suspect that had no gun more frequently than the officers in the LA group. In fact, the number of incorrect shootings of the suspect with no gun was twice that of the LA group, and nearly 20% of the suspects without a gun were shot by the officers in the HA group. This means that one in five unarmed suspects was shot in the study. The effects of the stress and anxiety of being shot with rubber bullets appeared to have caused this (Nieuwenhuys et al.).

Even though on structure fires an IC is usually not being shot at, there is little doubt that being the IC on a structure fire is a stressful and anxious job that brings with it many distractions. Skip Coleman is a retired Assistant Chief from the Toledo, Ohio, Fire Department. Coleman states (2009) that the IC is responsible for the entire incident and must be able to focus on the entire incident throughout its duration. No matter how stressful or chaotic the incident, the IC must remain calm and manage the incident. Studies have shown that during stressful events people will fall into one of three categories. Ten to 20% of people will stay calm, composed, and maintain some form of rational decision making abilities. Another 10% to 20% will become so distressed that they will not be able function. The remainder of people will be uncertain of what to do and become followers, waiting to see what others will do (Dunne, 2013). It is the first group that an IC must fall into.

Bystanders and residents can cause additional distractions and stress on an IC according to Gasaway (2008). For example, if a resident shouts that someone is still trapped in the house that is burning, an additional level urgency is immediately added. This type of distraction can cause the IC to speed up the decision making process and lose focus on the entire incident. The IC must resist the impulse to speed up and make hasty decisions due to the imposed time constraints of rescuing the trapped victim before they become nonviable (Davis, 2012). There is no reason to hurry a strategy because something very important may be missed. UCLA basketball coach John Wooden used to tell his players "be quick, but don't hurry" (Emery & Rose, 2012).

Coach Wooden's statement is illustrated within the invisible gorilla video. In the video, six students are passing around two basketballs. Half of the students are wearing black shirts and the other half are wearing white. The viewers are asked to count the number of times the players wearing white shirts pass the ball. About halfway through the video, a person dressed in a black gorilla costume walks in the middle, pounds his chest, and then walks out. Even though the gorilla should be very apparent, most people do not see the gorilla at first. They are so focused on counting the passes they miss something quite obvious. Once they are told of the gorilla and watch the video again, they easily spot it. Emery and Rose (2012) relates rushing on the fireground to the gorilla video. If an IC hurries and becomes so drawn in on one thing, it becomes very easy to miss the gorilla and "missing the gorilla has killed or injured scores of firefighters" (Emery & Rose, 2012).

Another distraction that occurs frequently on the fireground is when the IC becomes involved in tactics. Gasaway (2008) says that in stressful times people will revert back to what they are comfortable with or what they know, which often times is basic firefighter tasks such as extending hoses. This can be a deadly distraction on the fireground. In the report published by the National Institute for Occupational Safety and Health (NIOSH) for the Charleston, South Carolina, LODD fire at the Sofa Super Store, radio transmissions from the interior crews asking for assistance in finding the exit were missed by the IC due to being distracted because of being engaged in fireground activities (National Institute for Occupational Safety and Health, 2009).

The IC needs to be anchored to the command post. There is no wandering around or doing firefighter tasks according to Emery and Rose (2012). Coleman (2008) says this takes the incident commander's focus off of the main job which is directing and leading crews during an emergency. Gasaway (2008) states that when incident commanders perform routine firefighting duties the distractions can cause them to miss clues that are critical to the incident. Coleman (2008) adds that once an IC issues an order or gives someone a task to complete, the IC should let the company officer complete the task. Company officers are in charge of their company, whether it is an engine company, truck company, etc., and the company officer to complete the task shows them the IC has faith and confidence in their abilities (Sheridan, 2011). Loflin (2009) adds that there will certainly be times when an IC wants to help out and become part of a task, but it simply cannot happen. The IC needs to remain at the ICP and focus on the strategies for the entire incident, not just one small portion of it. This is critical to a safe outcome (Loflin, 2009).

Not that long ago, it was expected the chief would make all of the decisions. Over the years this has been shown to be somewhat nonproductive as various management doctrines were violated such as unity of command and span of control (Shouldis, 2012). Now the paradigm has shifted, and most believe that the IC needs assistance and ICS support. Due to all of the requirements placed upon an IC, Ciarrocca and Harms (2011) state that an IC needs to possess exceptional skills. There is so much that needs to be done and one person cannot effectively do

it. (Ciarrocca and Harms, 2011). When they divide their attention, incident commanders are trying to multitask.

Multitasking is the term given to doing more than one thing at a time. This has become a buzzword in the workplace, and the fire service is no different. The term comes from the computer industry where a computer can divide its work into many tasks. Multitasking for a computer allows for several programs to be opened and running at once (Hallinan, 2009). Hallinan (2009) states that most people believe humans can multitask in the same way a computer does. However, computers are not actually multitasking. They are switching back and forth from one program to another, thus switching attention to each program. The computer does this thousands of times per second which gives the perception that it is doing more than one thing at a time, but in actuality it is not (Hallinan, 2009, p.78).

Hallinan (2009) says the human brain operates very similar to the computer when it attempts to multitask. However, the brain cannot switch back and forth anywhere near the speed a computer does. For this reason, when people say they are multitasking they are just diverting their attention from one task to another (Hallinan, 2009). The problem with trying to focus on more than one thing at a time for incident commanders is that the speed in making a descion is reduced and forgetfulness increases.

Hallinan (2009) discusses a study where students were asked to identify colored crosses and geometric shapes, and once they identified them to press a button. When the students saw the colored crosses and shapes at the same time, they often made mistakes identifying them and it took them nearly one second to press the button. But when the students were shown the colored crosses first and then the shapes, their reaction times were twice as fast (Hallinan, 2009, p. 79). Switching from task to task also causes forgetfulness. Humans have a working memory which is the short-term tasks that need to be accomplished. One problem that researchers have found is that when a human switches attention to a new task and begins thinking about the new task, the old task is forgotten within 15 seconds (Hallinan, 2009, p.80). This certainly can have dire consequences if an IC loses focus and forgets what is happening because attention is being placed elsewhere.

Another illustration of how humans attempt to multitask unsuccessfully is when another task or problem diverts attention, and focus is lost on the primary task at hand. Hallinan (2009) discusses this in the crash of Eastern Airlines Flight 401. According to Hallinan (2009), Captain Robert Loft was preparing to land at Miami International Airport and lowered the landing gear, however the indicator light did not illuminate. Captain Loft leveled the aircraft at 2,000 feet and attempted to look at the gear, but still could not figure it out why the light was not on. He summoned the first officer, the flight engineer, and a Boeing mechanic who was a passenger. All of these individuals were so fixated on the indicator light that no one was flying the plane. The last words recorded on the cockpit flight recorder were, "Hey! What's happening here?" (Hallinan, 2009, p.76). Five seconds later the plane crashed into the Everglades killing 99 people. After the investigation it was revealed that the landing gear was down, but the indicator light bulb was burned out.

Hallinan (2009) says that it is so common to crash a perfectly good airplane into the ground that a term was created for the process: Controlled Flight into Terrain (CFIT). CFIT remains one of the most lethal hazards in aviation. In fact 40% of all aircraft accidents and well over half of all aircraft fatalities are linked to CFIT, and since 1990 no other airline accident has killed more people. The United States Air Force was so concerned with the problem that they

launched an investigation in the late 1980's. The Air Force found that between 1987 and 1998 there were 190 fatalities and 98 lost aircraft from CFIT. This accounted for nearly \$2 billion in losses. The Air Force investigation also revealed that the pilots were so engrossed in doing something else in the cockpit, they simply forgot to fly the plane. The Air Force referred to the pilots trying to do too many things at once as task saturation (Hallinan, 2009).

Task saturation also occurs to incident commanders while on structure fires as they become overloaded with important tasks that need to be accomplished. In firefighter LODD reports released by NIOSH, task saturation of the incident commander is frequently listed as a contributing factor. One possible way to help alleviate multitasking caused by task saturation is to provide support to the IC. NFPA 1500 section 8.4.12 (2013) actually requires assistance be provided to incident commanders as incidents escalate. In the four NIOSH LODD reports that were reviewed, all four cited inundation of critical tasks on the IC as a contributing factor to the fatality. The NIOSH reports all called for aides to the IC and accountability officers be deployed as incidents escalate and require more resources. The four NIOSH reports were from LODD fires in Indiana, Connecticut, North Carolina, and South Carolina.

Firefighters are trained to work in teams, and the IC should not be any different argues Coleman (2008). He believes that even at mundane fires, two chiefs are better than one. His view is that having additional chief officers creates a think tank even if the other is a safety officer at the rear of the structure. He adds that fires always seem to run smoother with two chiefs. They are able work together as a team, prod each other, fed off of each other strengths, and improve the other's weaknesses. Coleman states "four eyes, four ears, and two brains are better than two eyes, two ears, and one brain" (Coleman, 2008). The United States Army has identified the need for support of a central commander. The research was conducted based on planning processes in land battles. Some of the characteristics of the battlefield were similar to structure fires. For example, the decisions were time critical, they could have life and death consequences, and there was a great deal of uncertainty. The information battlefield commanders receive is also complex and it is often difficult to confirm what information is accurate (Riley, Endsley, Bolstad, & Cuevas, 2006). The research concluded that decision support systems are critically needed for planning and that the central commander must have a support staff that can help gather and analyze data, develop response plans, make decisions, and monitor the consequences of the selected course of action while being able to modify the plan when needed (Riley et al., 2006).

Even if a second chief officer is not possible, the IC should be assigned an aide or assistant. NFPA 1710 section 5.2.2.2.5 states "supervisory chief officers shall have staff aides deployed to them for purposes of incident management and accountability at emergency incidents" (National Fire Protection Association, 2010). Ciarrocca and Harms (2011) believe that "officers assigned to the IC can improve command effectiveness and incident safety" (Ciarrocca & Harms, 2011). Due to all of the requirements placed upon an IC and the distractions faced, Ciarrocca and Harms (2011) believe that an IC needs assistance. There is so much that must be processed, no one person can do it alone, and this is where an aide or assistant comes into play. Ideally, the aide should be assigned to the IC on a daily basis. This will allow teamwork to develop and a relationship to be built. Since the aide will drive the IC to the fire, the IC will be able to review information from the dispatcher, review the pre-fire plan, begin drawing an ICS organization chart, and simply become mentally prepared for the incident without having to negotiate through traffic (Ciarrocca & Harms, 2011). Once on scene, Ciarrocca and Harms share the same view as Coleman, that two minds are better than one. The aide can observe the progress of the incident and offer input to the IC. The aide will also handle the radio traffic, documentation on the command board, accountability, and serve as the gatekeeper for the ICP. As people huddle around the ICP, it creates noise and unnecessary distractions for the IC. The aide will be able to handle people as they migrate towards the ICP, which keeps the IC focused on the incident (Ciarrocca & Harms, 2011). Ciarrocca and Harms (2011) state that ideally the aide should be riding in the same vehicle as the IC, however using additional command officers that are automatically dispatched is another option. Using an officer off of a responding fire company should only be used as a last resort. This reduces the staffing for the company and takes away the leader (Ciarrocca & Harms, 2011).

The Phoenix Fire Department has officers that assist the IC. These officers are called field incident technicians (FIT). The FITs are Captains that work with the Battalion Chief that serves as an IC at fires. Normally the FIT is on the Battalion Chief promotional list or someone that wants to promote to Battalion Chief and has a strong knowledge of the Phoenix Fire Department's command procedures and incident management. The FIT drives the Battalion Chief so the incident management process can be initiated while still en route to the scene. Administratively, the Battalion Chief and FIT work together on daily staffing, training, and routine administrative functions. Adding the FIT increases effectiveness both on the fireground and in an administrative capacity (Ciarrocca & Harms, 2011).

No matter how many people are involved at the ICP, an ICP must be established on all structure fires. NFPA 1561 section 5.3.7.1 requires an ICP to be established and stationary, and section 5.3.7.2 requires the ICP to be "located in or tied to a vehicle to establish presence and visibility" (National Fire Protection Association, 2008). Most incident command posts at

structure fires are based around the command officer's vehicle. NIOSH recommended in the North Carolina and Indiana LODD reports that the IC should establish a fixed ICP in the vehicle or at the rear of the vehicle with a command board to maintain effective command and control functions (National Institute for Occupational Safety and Health, 2012).

The Virginia Beach, Virginia, Fire Department realized over 20 years ago that a command vehicle is an effective way to manage an incident. According to Loflin (2009), the Virginia Beach Fire Department set up the ICP at the rear of the vehicle. The vehicle had all of the tools necessary to help an incident commander, such as command boards, radios, and accountability systems. Loflin (2009) added that during inclement weather, the IC would work from the front seat, inside the vehicle.

Having the IC work from inside the vehicle has gone from a practice used in bad weather, to a shifting paradigm in incident management. Probably the most significant benefit from working inside the vehicle is being able to limit the distractions to the IC and allow the IC to remain completely focused on the incident (Ciarrocca & Harms, 2011). Ciarrocca and Harms (2011) add that in-car command is probably only effective up to 12 companies. After that, the incident becomes too resource intensive and at that point a move to the rear of the vehicle or to a mobile command post should be made. This is to allow for more room to track resources and document on a command board (Ciarrocca & Harms, 2011).

The theory behind in-car command is to provide an environment where the IC can focus on the incident by limiting distractions (Davis, 2012). This is based on the Federal Aviation Administration's (FAA) sterile cockpit rule (Davis, 2012). According to a FAA memorandum sent to all airlines, "Regulations regarding sterile flight decks prohibit crew members from performing any duties not relating to the safe operation of the aircraft during critical phases of flight" (Federal Aviation Administration, 2010). This means that nothing should be distracting the pilots while they are focused on flying during critical phases of flight.

The sterile cockpit rule's "critical phases of flight" are the times around takeoff and landing. While takeoffs and landings only represent four percent of the journey time, 70% of all aircraft accidents occur during them (Poulsen & Edkins, n.d.). The sterile cockpit timeframe is divided into two segments. During one segment the flight deck can only be contacted if a safety issue arises. During takeoff, the safety related issues segment is from the time all doors to the aircraft are closed and ends when the seatbelt sign is turned off. On landing, this segment begins when the announcement is made to prepare the cabin for arrival and ceases when the aircraft reaches the terminal (Poulsen & Edkins, n.d.).

The other segment, which is embedded within these timeframes, is the no contact period. During the no contact period, absolutely no contact is allowed to be made with the flight deck. This is when the highest workload and risk is present. During takeoff the no contact period begins during the takeoff roll and ends when the landing gear is taken up. During landing, the no contact period begins when the landing gear is put down and ends with the aircraft leaving the runway (Poulsen & Edkins, n.d.). The reason contact is not permitted is due to the high workload and level of risk involved, and even one distraction can disrupt the flight crew at a very critical time. Even if someone attempts to contact the flight deck during the no contact period, usually no one will answer as they are so focused and inundated with tasks (Poulsen & Edkins, n.d.).

The sterile cockpit rule has also encroached into the medical field. When nurses are preparing medications, many facilities now have established sequestered zones. According to Lisa Piatt R.N., unit manager of the cardiac intensive care unit at Grand Strand Regional Medical

Center, this means that when a nurse is in the sequestered zone, which is usually in or around the medicine room, no one is allowed to contact them (personal communication, May 7, 2013). This theme has also been present within anesthesiology. The Association of Anesthetists of Great Britain and Ireland conducted a study on critical phase distractions and the efficacy of the sterile cockpit concept.

The study conducted by Broom, Capek, Carachi, Akeroyd, and Hildtich (2011) states that usually anesthesia is introduced into the patient in a calm and controlled environment, with the anesthetic room providing a safe haven from the distractions of noise and interruptions. However, in the operating room there are more people, it is louder, and there are more distractions. The study collected data from 30 inductions of anesthesia, 30 maintenance phases, and 30 emergences when the patient left the operating room. The number of staff members was noted, as well as measurements taken of the noise levels (Broom et al., 2011).

The results of the Broom et al. (2011) study revealed that there were substantial noise distractions and the noise levels and distractions were greatest during emergence. Previous studies have shown that excessive noise has reduced mental efficiency and even affected short term memory. Music was found to be playing in over one-third of the cases, and over 25% of the anesthetists believe the music lessens their vigilance and ability to communicate, and over 50% feel it is distracting during difficult cases. As many as 11% of patients experience an adverse event during aesthesia, of which half may be preventable, and the usage of an anesthetic sterile cockpit may be beneficial (Broom et al.).

Even the smallest of distractions can cause problems with focus according to Dubin (2002). Dubin (2002) discusses the process of attention and describes the act of reading a book.

Dubin (2002) states that even though the intent is to pay undivided attention to the material, there are constant distractions that affect concentration and the ability to pay attention while reading.

He states that noises come and go from people talking, to appliances, to traffic, and planes flying overhead. He also says there are visual distractions such as a light flickering, a housefly flying around, and various other distractions that can be seen in the peripheral vision. He even mentions tactile distractions such as the feeling of the book, the ambient air temperature, and how clothing may rub against the body. All of these affect the ability to pay complete and total attention to the book. However, most of these little distractions can be compensated for. The real problem arises when there is something novel that creates a distraction, such as someone calling your name, a loud, startling noise, or the fly flies in front of the book causing the eyes to move and lose the place in the book (Dubin, 2002). All of these types of distractions while reading a book can certainly occur to an IC on structure fires.

## Procedures

The descriptive research method was utilized for this research. After establishing the research questions and conducting the literature review, attempts were made at trying to determine how external distractions affect focus and performance. The first step was interviewing Dr. Joan Piroch, Ph. D., professor of psychology at Coastal Carolina University (CCU). Dr. Piroch has been teaching at CCU for 31 years and spent 22 years as the chair of the Department of Psychology and Sociology. She holds a doctorate degree in Psychology from the University of South Florida and has been published in numerous professional journals. She has also made presentations to professional and academic organizations. She was selected due to her knowledge and research interests in human learning, memory and cognition, and stress

management. Her husband was also a firefighter and she has a working knowledge about of the fire service. See Appendix B.

After meeting with Dr. Piroch, two additional interviews were conducted. Both of which were to determine how distractions affect focus and performance in professions that are both stressful and where there is little room for error. Dr. John Arnold, M.D., is a practicing anesthesiologist. He was asked to discuss how distractions have affected his experiences. Dr. Arnold attended undergraduate and medical school at the University of Indiana in Bloomington. He completed his residency at the Indiana University School of Medicine Hospital in Indianapolis, Indiana, and is currently working for Michiana Anesthesia Care in South Bend, Indiana. See Appendix C.

Along the same lines, recruits in the military incur a lot of stress and distractions while in basic training. To understand how these external distractions affect the recruits, an interview was conducted with Sergeant Josh Dickison. Sergeant Dickison is a drill instructor in the Marine Corps currently assigned to 1<sup>st</sup> Battalion, Bravo Company, Marine Corps Recruit Depot Parris Island, South Carolina. Marine boot camp is the longest, and arguably the toughest, recruit training process in the military. Recruits are inundated with much to learn and process in a short period of time to prepare them for combat. What they learn, or do not learn, in boot camp may cause someone to be injured or killed in combat. Similar to the fire service, the decisions that are made can determine life or death. See Appendix D.

The final step to determining how external distractions affects focus and performance, a practical application needed to be performed. The "Performance and Focus Assessment" (PFA) was created and had two parts. See Appendix E.

The first part utilized a basic arithmetic test. Four worksheets with 20 addition problems on each sheet were printed from the mathematics website www.mathworksheets4kids.com. The worksheets were selected from the website in the third grade level. Each worksheet was comprised of adding two, three-digit numbers together. One subtraction worksheet was also printed from the website. The subtraction worksheet met the same criteria as the addition worksheet, except it was subtraction. Random subtraction problems were cut off of the subtraction worksheet and taped onto the addition worksheets. This was done with corresponding numbers. For example, when #15 was cut from the subtraction worksheet, it was attached and covered up the #15 problem on an addition worksheet.

After the subtraction problems were placed on the addition worksheets, copies were made and a test packet was constructed. The test packet consisted of four pages of 20 arithmetic problems each, mostly addition. Page one had one subtraction problem, page two had three subtraction problems, page three had two subtraction problems, and page four had two subtraction problems. The reason for incorporating the subtraction problems was to see if the participants caught the change in math measuring their attention.

After completing the test packets, a timeframe needed to be established in which the participants had to complete each page. Having a timeframe was important to try and create some level of stress and pressure by making them feel rushed. Each sheet was given to someone that was not participating in the study and they were asked to complete it while being time. The test was given to five people and they were timed while completing each page. The educational background of the five people included three with bachelor's degrees and two with high school diplomas. The average time it took for completion of one page was two minutes and 22 seconds.

Therefore, for the purpose of the study a timeframe of 2 minutes and 25 seconds was given to the participants.

In order to create an environment of the unknown in an attempt to create stress within the participants, no one was told of the study. Lieutenants from all six stations were told to have certain companies at the training academy by 9:00 a.m., in classroom one. Apparently this did create some feelings of uneasiness, as there was widespread talk about what was happening. The selection for the participants was based on a stratified sampling. All participants were on the same shift and all ranks were represented from Firefighter to Lieutenant. Some participants were paramedics, and all education levels were represented from high school only, to some college, to bachelor's degrees, and one graduate student.

The classroom at the training academy was set up with three tables connected end-to-end in each row, and there were three rows with enough room for nine people in each row. Each row was facing the front towards the dry erase board, the 50-inch television, and the door. Also placed in the room were four devices from the firefighter tracker kit. These devices are referred to as cookies, and each has a strobe light and emits a loud audible honking type sound. Two cookies were placed at the front of the room, and one on each side wall. Finally, a laptop computer was linked to the TV. A video from www.youtube.com was placed on the Internet browser. The video was titled "The Most Annoying Video on Youtube" (Brown, 2006). The video had a man making various noises and there were different flashing lights on the screen. The tracker cookies and video were going to be used to create a distraction. The lighting was normal fluorescent lightning with a switch that controlled four sets of lights. All lights were on and the room temperature was set at 72 degrees Fahrenheit. Once all of the participants were present, they were told that they would be taking four basic math tests to evaluate their ability to complete a task under pressure. They were also given the option of not participating if they did not want to. Unknown to the participants was that the test had certain external forces that would be revealed once they began the second test. The instructions were read, "You will have 2:25 minutes to complete the first worksheet. You will begin when I say go." After the go order was given all of the participants worked on the problems and they were told to stop when the two minutes and 25 seconds expired.

After 30 seconds, the instructions for the second worksheet were read, "You will have 2:25 minutes to complete the second worksheet. You will begin when I say go." After the go order was given all participants began working on the problems. This researcher left a cell phone in the middle of the room with the ringer turned all the way up and the vibrate feature also activated. At 15 seconds into the test a call was placed to that cell phone. The phone was answered by this researcher after the third ring. This researcher pretended to be startled by the news and conducted a fake conversation about a Captain on the fire department being arrested. After 30 seconds this researcher exited the classroom and slammed the door shut. When the two minutes and 25 seconds expired, this researcher entered the room and told the participants to stop.

After another 30-second interval, the instructions for the third worksheet were read, "You will have 2:25 minutes to complete the third worksheet. You will stand behind your table and bend over to complete the worksheet. You will begin when I say go." The bending over was to simulate an IC bending over while on an incident to write on a command or accountability board. After the go order was given all participants began working on the problems. Approximately halfway through the third test, the thermostat was raised to 85 degrees and the heat turned on.

The participants were told to stop when the two minutes and 25 seconds expired and were allowed to sit down.

Prior to beginning the fourth worksheet, casual conversation was started. This was to allow the heat in the room to climb to over 80 degrees. Once the thermostat reached 80 degrees, the instructions were read again, "You will have 2:25 minutes to complete the fourth worksheet. You will begin when I say go." After the go order was given all participants began working on the problems. Immediately after beginning, the youtube.com video was started at the fourminute mark on the TV with the volume at the highest level possible. Then, all four tracker cookies were turned on, the strobes were activating and the audible system was sounding. Once the two minutes and 25 seconds expired, the participants were told to stop and everything was turned off. The air conditioning was turned back on and the thermostat was set to 72 degrees.

The second part of the PFA given to the participants was a modified version of the "D2 Test of Attention" created by Rolf Brickenkamp and Erin Zillmer. Dr. Piroch gave this instrument to the researcher, and the test is used to measure attention to detail and the focus of an individual. The D2 test is comprised of 14 rows that contain 47 letters each using only d and p. Each letter is two millimeters high and either above or below each letter is a hash mark. The hash mark is a straight line that is approximately one millimeter in height. The participant is to make a slash across all of the d letters that have two hash marks either above it or below it. Any d with the two hash marks either above it or below it that are not marked by the participant is considered an incorrect answer. Anything else that is marked other than the d with two hash marks either above it or below it is also considered an incorrect response. Each row is completed in sequential order and 20 seconds are given to complete each row. This test was being used to
measure focus and attention, but steps were also put into place to create distractions to see if it would influence the outcome.

The participants were explained how to take the D2 test. No one had questions, and they were instructed that they would be told when to start and when to finish, and that there would be a minimal break, less than 15 seconds, in between rows. They were not told of the distractions that would be occurring. For the purpose of this study each row was completed as normal or backwards. These terms relate to which way the row was completed. Normal means the row was completed from left to right. Backwards means the row was completed from right and ending at the left. Rows one, two, eight, 11, and 14 were all completed normally, with no distractions. Rows three, four, and 13 were completed backwards with no distractions. Rows five and six were completed normally, but there was a comical television show being played on the TV at full volume capacity. Row seven was completed backwards, with the same television show playing on the TV at full volume again. Row eight was done in the normal manner, but with two sets of the four fluorescent lighting sets turned off. Row nine was normal with two sets of the four sets of fluorescent lighting turned off, and with the tracker cookie strobes flashing. Row 10 had two of the four sets of fluorescent lighting turned off with the tracker cookie strobes flashing as well, but it was completed backwards. For row 12, two of the four sets of fluorescent lights were turned off and on repeatedly through the 20-second timeframe, and it was completed normally.

In order to understand what steps other fire departments have taken to assist incident commanders with increasing their effectiveness on structure fires, a survey was created. The "Fire Department Incident Command" survey was created using surveymonkey.com and contained 11 questions. See Appendix F. The survey was sent electronically to over 500 chief officers in different departments throughout the United States. See Appendix G. The sampling was done on a random basis and departments were selected from the International Association of Fire Chiefs website. Using a random sampling from all over the country was deemed the best method to get a good representation of what fire departments are doing. The questions were multiple choice and short answer. They were developed to gain an in depth understanding of what methods are being utilized across the national fire service landscape to improve command effectiveness.

After the surveys were sent, a more specific need to actually speak to someone became evident. Two telephone interviews were conducted with chief officers in departments that have experienced a LODD. The first was with Mark Davis, who is a battalion chief with the City of Charleston, South Carolina, Fire Department (CFD). Chief Davis was one of the last firefighters to make it out alive at the Sofa Super Store fire on June 18, 2007. The fire claimed the lives of nine Charleston firefighters, and ineffective ICS practices were listed as a contributing factor. Chief Davis is currently the department's Health and Safety Officer, and has served as an operational Battalion Chief and the Battalion Chief of Training. The purpose of the questions was to gain an understanding what the ICS practices were before the Sofa Super Store fire and what changes have been implemented over the last six years. See Appendix H.

The next interview was with Fire Chief Scott Burnette of the City of Asheville, North Carolina, Fire Department (AFD). Chief Burnette possesses a master degree in Executive Fire Service Leadership from Grand Canyon University and is an Executive Fire Officer Program graduate. The AFD suffered a LODD in 2011 at a high-rise fire. The fire and circumstances surrounding it were eerily similar to a high-rise fire two weeks earlier that the MBFD responded to where a rescue company was lost and called a mayday. The purpose of the interview with Chief Burnette was to understand their ICS and command practices before and after the LODD fire. See Appendix I.

Certainly understanding how the MBFD command officers view the department's current ICS practices structure fires is imperative to bettering the incident commander's effectiveness. To attain this, the individuals that serve as incident commanders in the MBFD were surveyed. The individuals that serve as incident commanders are the three shift Battalion Chiefs, and in the absence of the Battalion Chief the shift Captain fills in that role. The Assistant Chief is in charge of the Emergency Services Division and oversees all operational details, but does not serve as an IC. This researcher is a shift Battalion Chief and did not participate in the survey, only the other two Battalion Chiefs, the three Captains, and the Assistant Chief were surveyed. The first 10 questions were simple yes or no responses. The remaining six questions were discussion based and required further expansion and details. See Appendix J.

After the surveys were completed, a means to see how the MBFD incident commanders actually operate seemed fitting. While it would be difficult for this researcher to respond to every structure fire call on the initial alarm, watching video of structure fire operations would give a general idea. The command vehicle has two video cameras and the department has made it a priority for the IC to capture footage. The past two years of fire footage were viewed and notes were taken on the incident commander's actions.

While viewing the video there was an observation made that the background noise seemed to fluctuate as the doors were opened and closed in the command vehicle. This led to conducting a test to gauge the noise level at the MBFD command vehicle. For this test a smartphone decibel meter was used. The noise level inside the running command vehicle was documented with the windows up and the vehicle inside the bay at the station. The noise from a fire engine was then measured while the engine was outside running at 1,600 revolutions per minute (RPM). With the fire engine running at 1,600 RPM the noise inside the command vehicle was measured while the vehicle was running with the windows up and 75 feet away from the engine. The last measurement was taken with the fire engine still running at 1,600 RPM and the command vehicle parked next to it. The command vehicle's windows were up, it was running, and the passenger side door was three feet from the passenger door on the engine.

There were some limitations to the research. When administering the PFA to the participants, the distractions were not as severe as those encountered on the fireground. There was simply no way to create an environment that replicates the chaos and same distractions as those found on the fire ground. Also, there was no way to create to the same level of stress that is present on a fireground. The participants knew in reality there was nothing riding on the PFA, nor was anyone's life in danger, therefore there was no real sense of urgency or mounting anxiety.

In regards to the MBFD command officers survey, the individuals that were involved may have felt limited to what they were willing to say given the fact that it was about their own department and employer. Also, knowing only six people were interviewed and others may see their responses could have influenced their responses one way or another.

The final limitation was with trying to observe the actions and practices of MBFD incident commanders at fires. Again, it would have been extremely beneficial to be present on every initial dispatched structure fire call, but this was simply impossible. The videos from the command vehicle were beneficial and provided a good insight into the incident commanders' operation, but not as good as actually being able to observe them entirely on an incident.

#### Results

When trying to ascertain how external distractions affect focus and performance, Dr. Joan Piroch (personal communication, April 24, 2013) stated that anything that interferes with attention, also known as distractions, will shift a person's focus and decrease cognitive ability. She adds that most humans are able to do more than one task at time once they have done it over and over. She cited as an example driving a car. She stated that someone can drive a car, talk on the phone, and listen to the radio at the same time after they have been driving for some time. Conversely, an inexperienced driver will have more difficultly and will need to focus more on the actual task of driving. However, when distractions arise focus is lessened and something needs to give. Elaborating on the driving example, she stated that once someone gets lost or traffic increases, people will usually end the phone call or turn down the radio. This is because the noise distractions are affecting their focus and abilities (J. F. Piroch, personal communication, April 24, 2013).

Dr. Piroch (personal communication, April 24, 2013) says the reason why distractions affect humans are due the processing abilities of the brain. The human brain cannot process more than one input when the input is important. This is why most people cannot carry on two conversations at the same time if the conversation topics are of importance. The human brain simply cannot process various inputs without losing focus on the other.

The senses also limit how distractions affect focus and performance Dr. Piroch says (personal communication, April 24, 2013). Visually, humans can process multiple items at one time. For example, while driving a person can usually see the car in front, people walking on the sidewalk, billboards, and the lines on the road. This is called parallel processing. However, hearing is a serial process that means humans can only process one thing at a time. This relates

back to not being able to carry on two important conversations at once. Dr. Piroch states that when someone listens to more than one auditory stream at a time there are definite limiting effects. When visual and auditory processes are conducted at the same time, only one can take preference and it is highly individualistic as to which one will take preference. For example, if someone is looking at something and then hears their name, they will usually drop their visual attention and focus on the verbal stimuli (J. F. Piroch, personal communication, April 24, 2013).

Stress is also a distraction that affects cognition and focus. Dr. Piroch (personal communication, April 24, 2013) states that stress lessens a person's ability to concentrate, causes problems with being able to prioritize, and decreases judgment. These are all physiological responses that cannot be changed. Dr. Piroch cited the Yerkes-Dodson Curve, which states that when stress or arousal is increased, a person's performance will increase. However, once the stress or arousal becomes too great, there is a tip over point and performance will then decrease.

Dr. Piroch (personal communication, April 24, 2013) illustrated this by discussing one of her students. She stated the student was preparing to give her final presentation for her senior capstone psychology class. The student was extremely nervous, but began the presentation well. However, she heard some landscapers doing work outside the building and this caused her to lose her focus. She became more nervous, anxious, forgot what she was saying, and became so focused on the landscapers making noise that her presentation went downhill. Once she was hyper-aroused, her performance suffered. This is an example of how distractions can weaken focus and performance.

Dr. John Arnold, M.D., also lists examples of how distractions can hinder focus and performance. He stated (personal communication, March 22, 2013) that during his residency he witnessed medical errors. He said some were because of doctors having impaired judgment and

abilities from being tired, but the majority of the errors he witnessed were during uncontrolled and chaotic cases. He elaborated that these cases were usually trauma patients. Dr. Arnold says the stress of the environment that is created when dealing with trauma can be overwhelming. During trauma cases there is a dire need to stabilize the patient before death occurs. And in trauma, it is not as simple as a medical emergency where specific algorithms are followed. Trauma patients rely on doctor's critical thinking abilities to make split second decisions. Dr. Arnold adds that in trauma there are many distractions such as a loud emergency room with people raising their voices in the trauma bay, numerous healthcare providers present, noises from the machines and equipment, and high stakes for the patient. He said these factors lead to errors (J. Arnold, personal communication, March 22, 2013).

Dr. Arnold (personal communication, March 22, 2013) went on to say that personally, he can get distracted when preparing anesthesia for a patient having surgery. He said he never really thought about it until asked, but when he is prepping an unstable patient for surgery, or has to make difficult calculations, he will find a quiet place to get away from distractions. "I never really thought about how distractions affect me. But when I do something that is out of the everyday norm, I find a place that is quiet where I can concentrate without distractions" (J. Arnold, personal communication, March 22, 2013).

Distractions and stress are part of life for recruits in Marine Corps boot camp. Sergeant Dickison (personal communication, June 8, 2013) says that early on in boot camp, recruits are greatly overwhelmed. They are loaded down with tasks and subjected to a lot of verbal stimuli. Sergeant Dickison added that he has seen recruits so stressed that they simply freeze and not know what to do next. He also says that he has had recruits in training that were college graduates but became so stressed and over stimulated they were unable to say a word when asked a question. Sergeant Dickison continued that older recruits tend to adapt to the stress more easily than the younger ones (J. Dickison, personal communication, June 8, 2013).

During boot camp recruits are placed in numerous pressure situations. Prior to graduation, the company commander and the battalion commander inspect the recruits. Sergeant Dickison (personal communication, June 8, 2013) says the recruits are definitely nervous, but they are also confident in their abilities, and this confidence helps calm the nerves and allows them to focus. The final event prior to graduation is The Crucible. This event is a 54-hour combat style operation where the recruits work on limited food and sleep and have to complete various tasks. According to Sergeant Dickison, as The Crucible progresses the recruits actually perform better. The drill instructors are in more of a mentoring capacity and the recruits come together as a team. Even though there are a lot of distractions and they are tired and hungry, their performance level rises. When asked why he thinks this is, Sergeant Dickison (personal communication, June 8, 2013) said that the drill instructor team has spent so much time with them, working with them, training them, and guiding them, they have been mentally prepared to adapt.

Sergeant Dickison (personal communication, June 8, 2013) adds that the noise in boot camp is a distraction and recruits often do not know what to do. There is a lot yelling and motivating, and some recruits simply do not like it. There is also noise on the assault courses. While negotiating the courses there is machinegun fire overhead. Sergeant Dickison says usually the first time they hear it is a distraction, but the more they are around the yelling and gunfire, the more conditioned they become to it. He added that most recruits adapt in a few weeks, and those that do not will not make it (J. Dickison, personal communication, June 8, 2013). The results of the math portion of the PFA were consistent with the interview responses that outside distractions have some interference with focus and performance. For the first worksheet under normal conditions with no distractions, the median number of incorrect answers was 2.4, with a median percentage of correct answers being 88%. On the second worksheet that involved the interruption with the cell phone call and conversation, the median number of incorrect answers was five, with a median of correct answers at 75%. The third worksheet required the participants to stand up and complete the work while being bent over. This resulted in two being the median number of incorrect answers, and a 90% median of correct answers. Finally, the fourth worksheet incorporated the annoying youtube.com video, tracker cookies, and room temperature over 80 degrees Fahrenheit. The median number of incorrect answers for this scenario was 4.36 with a median of 78.2% being correct.

The results of the D2 Test portion of the PFA differed from the math section. The first two lines were under normal conditions without distractions, while the second two lines were done backwards, also without distractions. The median for incorrect responses was 4.28, 4.36, 2.52, and 3.93 respectively. Lines five and six were both completed normally, but had a television show playing. This yielded a 3.8 and 2.92 median for incorrect responses. Line seven had a 4.12 median of incorrect responses and was completed backwards with the same television show playing as in lines five and six. Lines eight, nine, and 10 were all done in low lighting. Lines eight and nine were in normal fashion and line 10 was backwards. Lines nine and 10 also had the cookies activated. The incorrect responses had a median of 4.24, 2.88, and 3.32 respectively. Line 11 had no distractions and was completed normally with a median of 3.16 incorrect responses. Line 12 was normal and used flashing overhead lights as a distraction, with a 3.6 incorrect response median. Lines 13 and 14 each had no distractions, but line 13 was

backwards and line 14 was normal. They had a 3.6 and 3.96 incorrect response median respectively.

When attempting to understand how other fire departments have tried to increase the incident commander's effectiveness, 286 chief officers, all from different fire departments, completed the "Fire Department Incident Command System" survey. This resulted in 47 states being represented. Figure 1 illustrates that 57.2% of the surveyed chief officers believe that one person cannot effectively handle all of the functions required on an IC on structure fires.



Over two-thirds of the survey participants do not believe that one command officer is sufficient on structure fires as seen in Figure 2. However, as Figure 3 reveals, 57.7% of the surveyed departments send more than one command officer on the first alarm of a structure fire, while less than 40% of the departments provide an assistant/aid to the IC as illustrated in Figure 4.







Of the departments that completed the survey, less than 35% have pre-set ICS assignments for day work administrative staff officers that respond to structure fires as shown in Figure 5.



When asked to describe the location of the department's ICP, 56.7% have the IC operate from the rear of a command vehicle. Of the 51 participants that answered "other," over half place their IC in the front yard or in front of the building, and 10 more stated they have the option to stay in the vehicle. See Figure 6.



As illustrated in Figure 7, of the departments that completed the survey about one-fifth send a dedicated officer that will serve as the safety officer and another one-fifth send a second command officer that will serve as the safety officer. There were 88 responses posted in the "other" category. The responses most frequently given were the IC will assign an officer to handle safety, training officers or staff officers will respond on second alarms to fill in as a safety officer, and that a safety officer rarely gets assigned due to manpower limitations.



According to the survey responses, and shown in Figure 8, when a higher ranking chief officer arrives on the scene of a structure fire they assume command 21.8% of the time and provide assistance to the IC nearly half of the time. Well over half of the 69 "other" comments describe the higher ranking chief officer as having the option to assume command, but will only do so if the incident complexity dictates the need to. Otherwise, they remain at the ICP and assist the IC with decision making, strategies, and tactics.



When asked to reply to what benefit the department has seen when more than one command officer was sent on structure fires, 189 responses were given. The top four responses were increased assistance to the IC, increased safety, increased accountability, and the ability to place command officers in supervisory roles such as group or division supervisors.

When asked what operational changes have been made to help increase the incident commander's overall command and control efforts, 136 responses were received. However, there were a wide variety of responses, each with their own merit and reasoning, but unfortunately too many to list. The two responses that were given most repeatedly were adding support personnel to assist the IC and implementing command training through Blue Card. Blue Card is an ICS certification program that uses online, classroom, and simulation training to help prepare incident commanders to handle local emergencies.

Two interviews were conducted with fire departments that experienced LODDs in the Carolinas in an effort to understand what they have done since the event to aid incident commanders. The first was held with Battalion Chief Mark Davis of the Charleston, South Carolina, Fire Department. On June 18, 2007, the CFD lost nine firefighters in the Sofa Super Store fire. This incident brought into national attention all of the operations of the CFD. Prior to the Super Sofa Store fire, the CFD responded one Battalion Chief on structure fires. Their normal staffing for the day was three Battalion Chiefs and one Assistant Chief that oversaw the entire shift. The Assistant Chief had the option to respond to fires at their discretion (M. Davis, personal communication, June 3, 2013).

Since the tragic fire in 2007, the CFD has completely revamped all of its operations. One of the major changes according to Chief Davis (personal communication, June 3, 2013) has been the regionalization of all of the fire departments in the area. All of the departments share the same operating guidelines and all respond with automatic aid as needed. Specifically for the CFD, Chief Davis stated the department has added another Battalion Chief per shift, added a fulltime Health and Safety Officer position, and added staffing on fire suppression units to no longer allow two just firefighters on them. From the ICS standpoint, all of the Battalion Chief's vehicles have been setup the same way, the Battalion Chief has an aide when staffing allows, the IC remains in the vehicle while commanding a fire, and a command platform is established where two or more Battalion Chiefs or an Assistant Chief will work as a command team (M. Davis, personal communication, June 3, 2013).

Chief Davis (personal communication, June 3, 2013) says the new response to structure fires now includes two Battalion Chiefs on the initial dispatch. The first arriving Battalion Chief will assume the role of the IC and move to the passenger seat inside the vehicle. The second arriving Battalion Chief becomes the accountability officer. The second Battalion Chief has the option of assigning the accountability officer role to a company officer, and if this happens the second Battalion Chief becomes the safety officer. The Assistant Chief responds as a senior advisor to the IC, and will get in the driver's seat of the command vehicle to assist the IC (M. Davis, personal communication, June 3, 2013).

According to Chief Davis (personal communication, June 3, 2013), the use of in-car command "was an adjustment, but now it's 100% better than being outside the car. Once you get used to it you'll never go back" (M. Davis, personal communication, June 3, 2013). He continued by saying that it is much easier to hear radio traffic and it limits distractions. He says the IC is responsible for everyone and it lets the command team think on a strategic level while the company officers handle the tactics. He also said that after reviewing audiotapes it was discovered that incident commanders missed radio traffic when operating outside the vehicle and some of the missed transmissions included mayday calls. He added about in-car command, "You wouldn't just walk into the fire chief's office and disturb him, so why do we want people interrupting someone's thought process while they're trying to make decisions with people in a dangerous environment?" (M. Davis, personal communication, June 3, 2013).

Training for the command officers has been another big change says Chief Davis (personal communication, June 3, 2013). The CFD is in the process of getting all officers certified through Blue Card and hope to have it completed by 2014. The CFD is also in the process of becoming a Blue Card Command Training Center. The Battalion Chiefs receive training on in-car command regularly. They pull their vehicle into a garage and have a screen with a fire simulation on it, and they are supposed to manage the incident. Battalion Chiefs also receive command training every Friday, and company officers receive two hours of command training every month. Chief Davis continued by saying the department has gone to a more firebased training curricula even though they provide medical, rescue, and hazardous materials response as well. "Firefighters aren't getting killed on medical calls," Davis said (personal communication, June 3, 2013).

The second interview was conducted with Scott Burnette, Fire Chief of the Asheville, North Carolina, Fire Department. The AFD suffered a LODD on July 28, 2011, when Captain Jeffrey Bowen was killed at three-alarm structure fire. Prior to the LODD fire the AFD had two Battalion Chiefs and one Deputy Chief on duty, but only sent one Battalion Chief on structure fire calls. Chief Burnette (personal communication, June 3, 2013) says the department has a lot of experience with single-family dwelling fires, as they respond to about 280 working structure fires per year, and most are single family dwellings. Of those 280 fires, only about three or four are large commercial fires, and those are usually exterior defensive operations. The command officers had a lot of ICS training, but the department had no measures in place to expand the command structure when needed. According to Chief Burnette "it was never a problem before July 28, 2011, because we never had anything bad happen to that point" (personal communication, June 3, 2013). Chief Burnette added that the incident commander's span of control was "shot" because there were over 10 companies reporting to one IC at that incident.

Since the LODD fire, Chief Burnette (personal communication, June 3, 2013) stated that many changes have been made. The department spent a year studying best practices from around the country and 60 employees volunteered to help with the research. The first change occurred when the AFD indentified a station with an engine and truck company that had a low call volume and met the benchmarks for response times over 90% of the time. The two, threeperson companies were consolidated into one, four-person quint company. This freed up two personnel and made a four-person company. Chief Burnette added that they were also able to increase the command staff by adding a Battalion Chief, two Safety/Training Officers (STO) and a Deputy Fire Marshal on each shift (S. T. Burnette, personal communication, June 3, 2013).

According to Chief Burnette (personal communication, June 3, 2013) the command response on a structure fire is now two Battalion Chiefs, two STOs, and one Deputy Fire Marshal. The first arriving Battalion Chief will serve as the IC. The second Battalion Chief will don a self-contained breathing apparatus and report to the area with the most pressing need and assume the supervisor role. The first arriving STO will assume the role of safety officer while the other STO will work with the IC as a command technician, which is basically an aide to the IC. Chief Burette added that the positives have been tremendous. He said that the increases in safety and accountability are huge, and the IC is no longer overloaded (S. T. Burnette, personal communication, June 3, 2013).

Prior to the new command system the IC had to handle all of the tasks and task saturation was listed as a contributing factor in the LODD report issued by NIOSH. The IC was required to manage the incident, but was also required to notify the police department of road closures, notify City officials of the incident via e-mail, field phone calls, and go to each fire unit to collect accountability cards. Now, the command technician handles all that, along with running the command board and using the radio. The ICP has also been formalized, and now must be at the rear of the command vehicle, unlike in the past where it could have been anywhere. Chief Burnette said they explored the option of in-car command "heavily," but in the end decided not to use it (S. T. Burnette, personal communication, June 3, 2013).

Chief Burnette (personal communication, June 3, 2013) says that command training has changed as well, and now the AFD does a great deal of training with the chief officers. The department utilizes tabletop and video for command training. Also, live fire training drills are held monthly at the training academy. This includes a Battalion Chief and a full complement of units for a structure fire, and they utilize a complete ICS structure. This has moved them into a more real-world training setting and away from simulations for fireground operations. Chief Burnette adds they have been able to build relationships with local demolition companies to acquire buildings set to be demolished and use them for training. "We've partnered with the demolition companies to be able to get into buildings they have and train. The one thing the after action report revealed [from the LODD fire] was using more simulations equaled more failure" Chief Burnette said (personal communication, June 3, 2013).

While trying to determine how the MBFD command officers view the department's ICS practices at structure fires, Assistant Chief Mike Norket, Battalion Chief Bob Derr, Battalion Chief Ian Maxwell, Captain Charles Miller, Captain Mike Lewis, and Captain Thom Van Demark were surveyed. The surveys consisted of yes and no style questions and then open ended discussion questions. When questioned, all six of the participants agreed that one person cannot effectively handle the all of the functions required of an IC on structure fires, and they believe the IC should have an aide or assistant.

When asked if one command officer is sufficient on structure fires, all but one participant believe that it is not sufficient. All five of the Battalion Chiefs and Captains were asked if they have ever felt overloaded with tasks while in command, and all stated that they have. The Assistant Chief was not asked this question, as he does not serve as an IC.

Half of the command officers believe that day work staff officers should be given predetermined ICS roles when responding to a fire, and the other half do not believe they should have preset roles. And of the six interviewed, two are comfortable with using day work officers in their ICS structure, while four are not comfortable with using them. Only two participants believe all of their officers are capable of handling various ICS roles, while four do not.

All of the six participants do not believe there is adequate training within the department on incident management and command decision making. Five of the participants believe the department's guidelines have established effective procedures for operating at a structure fire, while one person does not. Finally, when asked if they always assign a safety officer on structure fires, all five command officers responded that they do not. The Assistant Chief was not asked this question. When asked what was expected of them as the IC, the Battalion Chiefs and Captains all responded that everything falls on them. One individual said, "Everything has to be covered by the incident commander. There is so much task saturation I believe the IC will miss something." Some of the examples they gave were establish command, monitor safety, create the incident action plan, handle the press, maintain accountability, overall scene management, order resources, document on the command board, work the radio, answer the cell phone, establish the strategies, set up the camera, hook up to the thermal imager, do a walk around the building, interact with other agencies such as police, maintain fire coverage in the City, and handle making all of the notifications.

When the Assistant Chief was asked what he expects of the incident commanders he stated he expects a good size-up, appropriate selection of strategies and tactics, overall safety, create an incident action plan, maintain accountability, communicate with the dispatchers, and manage resources.

When the Battalion Chiefs and Captains were asked what are some of the distractions they encounter on structure fires, the number one response by far was people coming up to the command post. Other distractions they listed were civilians and pedestrians, ambient noise, excessive radio traffic, and cell phones ringing. One response was there are too many fire apparatus on the scene. This individual said, "We have too many vehicles. It takes us a ton of rigs to get 20 people, and then we have to assign them."

When the Battalion Chiefs and Captains were asked to explain how they set up their command posts, three responded by saying they remained in the command vehicle. Of those three, they all said they sometimes get out and move to the rear of the vehicle if the incident escalates because they have more space to operate. While inside the vehicle, they all use a smaller command board on paper to document the incident. Some of the positives that were given are that there are less noises and distractions, it allows time to think, and the incident seems to slow down. The negative that was given is the loss of interpersonal, face-to-face, communication. One person stated that "the positives far outweigh the negatives."

The other two run command from the rear of the vehicle. One individual responded that he always goes to the rear of the vehicle and uses the magnetic command board. The other person stated he goes to the back of the vehicle because that is the way it has always been and that is all he knows. He added that in-car command is a foreign concept to him and it feels kind of odd to be in the vehicle, but it seems like it may not be a bad idea. The Assistant Chief added that he prefers the incident commanders to set up command at the rear of the vehicle with the accountability board filled out and positioned so it can be visible. He added the ICP needs to be run the same way for all three shifts. He also believes the IC needs an aide and someone to work the command board that can act independently and does not have to be told what to do.

The department has recently added an additional support service company to assist the IC at structure fires. None of the Battalion Chiefs or Captains have had an incident that has warranted its use. The Assistant Chief believes this is a good concept but needs to be standardized across the department on how the company will function. One person added, "Those companies usually don't have an officer, there is no pre-designated role, and those guys don't have the command knowledge. Two young firefighters aren't going to be much help."

The Assistant Chief, Battalion Chiefs, and Captains were all asked to express their views of the ICS practices within the MBFD. The Assistant Chief believes the department is about 90% of where it needs to be. The Battalion Chiefs and Captains seem to share the same sentiment with all saying that it is a lot better now than it was in the past, but there is still room for improvement. The consensus views are that the command operations are inconsistent throughout the department, there is no department standard for incident command, and that the IC is inundated with too much to do.

According to the Assistant Chief, the MBFD can improve command effectiveness by establishing a set way incident command is practiced on emergencies. He added that training also needs to improve, and the Battalion Chiefs should be teaching their officers how command needs to be performed and offer them training that challenges them and gets them out of their comfort zone.

The Battalion Chiefs and Captains also agree there needs to be standardization and everyone working on the same page. They also agree there needs to be more training. They suggest sending more people to national classes, and when people attend national classes allow them to try to implement what they have learned. Another suggestion that was given was to add personnel at the ICP by either adding another Battalion Chief position or placing the Captain in a vehicle to serve as an aide or safety officer. The final idea was to adopt a more regional approach where all the neighboring departments would share resources similar to the Charleston model. The departments would share the same operating policies and basically attempt to work as one large department.

After the interviews were conducted, two years of structure fire calls were viewed from the camera on the command vehicle. While the video did not always capture the actions of the IC, the audio was usually sufficient. After viewing the videos, a number of notable observations were made. The first was that one command officer never changed the mobile radio to the channel which the fire ground operations were on. This meant if the command officer was not in the car or at the rear of the car, there was no audio. Majority of the time, this command officer

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was visible in front of the vehicle, often times surrounded by firefighters. In fact, there was one incident where he was standing in the middle of the hoses that were on the ground. This is against NFPA and the NIOSH reports, and certainly can cause a distraction.

Another observation was radio transmissions being missed by the IC. There were numerous times where an interior crew would call the IC on the radio and it would take the IC several times to answer. There were also times where the IC was visible in the camera and shown talking to other people while interior crews were calling on the radio and the IC did not acknowledge them. Finally, at a large multi-alarm fire, the IC was running command from the rear of the vehicle, however the laptop computer with pre-fire plans is located in the front seat. The IC was shown leaning in the vehicle trying to access a pre-fire plan on the computer while two crews were engaged in interior operations. While the IC was concentrating on using the laptop computer, focus on the incident was a secondary priority at that time.

The third major observation that was made was the lengths the incident commanders go through to maintain accountability. All of the incident commanders were heard calling crews and asking for accountability checks repeatedly. This was noticed across the board and done quite frequently. All of the incident commanders in the MBFD appear to take accountability serious, and were all working diligently to preserve it.

The final observation was with the sound quality in the vehicle. When the IC remained in the vehicle, the quality of the radio traffic improved and the background noise was reduced. This was also apparent when the IC was at the rear of the vehicle and a side door was open. At a three-alarm fire in October 2012, the front mounted camera was turned and facing through the driver side window to view the building. While watching the video, the door can be seen open and there was a great deal of noise present from the fire apparatus, fans running, and basic fireground noises. However, when the door was closed the noise seemed to drop tremendously and the quality and clarity of the radio transmissions increased dramatically.

Because of this observation, a test was conducted to determine the noise levels from a fire engine while at the command vehicle. While parked and running at high idle at 1,600 RPM, the engine produced 106 decibels. With the engine in the same position and still running at high idle, the noise level was 65 decibels inside the command vehicle parked 75 feet away with the windows up. With the command vehicle's windows down and parked next to the engine at high idle, the noise level inside the command vehicle was 104 decibels. Once the windows on the command vehicle were rolled up, the noise inside dropped over 23%, down to a level of 80 decibels.

# Discussion

The results from the interviews with Dr. Piroch, Dr. Arnold, and Sergeant Dickison are consistent with external distractions having a negative effect on focus and performance. The information and experiences shared by them are supported in the literature and in the studies conducted by Kassam et al. (2009), Starcke et al. (2008), Nieuwenhuys et al. (2012), and Broom, et al. (2011). The MBFD must understand the serious implications that stress and distractions can place on an IC.

The results from the PFA are slightly different however. The math portion of the PFA is in agreement with the interviews and literature. The two worksheets with no distractions had the lowest number of incorrect responses and the median incorrect responses were nearly half that of the two worksheets that had distractions. The second worksheet had the phone call disruption and was consistent with Dr. Piroch's (personal communication, April 24, 2013) statement that humans have a difficult time carrying on a conversation with two people at the same time. It also supports Hallinan's (2009) view that humans are unable to multitask effectively.

There was an obvious groaning sound from some of the participants when the cell phone rang during the second math worksheet, and several of them even made negative comments about the phone ringing. The participants were also observed watching this researcher while on the phone carrying on the fake conversation. The fourth worksheet had the most sound and visual distractions, and it had the second highest number of incorrect answers.

On the D2 portion of the PFA, the results differed from those in the math portion. The rows that had the most incorrect responses where the first two that were completed, neither of which had any distractions and both were completed in normal fashion. This could be based on what Sergeant Dickison said regarding recruits in boot camp. Early on in training the recruits get overwhelmed and do not know what to do, but as training continues they become conditioned to the environment (J. Dickison, personal communication, June 8, 2013). The first two lines may have had the most incorrect responses because it was the first experience any of the participants had with the D2 test. But even after completing just two lines, they may have adjusted to it.

Another interesting finding is that four of the top six rows with the most incorrect responses occurred with no distractions present. This seems to be in line with the Yerkes-Dodson Curve. When the distractions were present the participants may have been focusing more than they did without distractions. Basically, their performance and focus was increasing while the arousal was increasing, resulting in fewer errors when other distractions were present.

While there were variations in the number of incorrect answers, there was no detectable pattern or trend illustrated with the use of distractions. Conversely, it seemed as though scores were better in most cases with distractions being present. The one pattern that was observed occurred when there were two ds with two hash marks back to back. When this was present, a large amount of people did not see that the second d required marking. This links to Dubin's (2002) explanation on having a delay in vision. While the delay for the input may be just a quarter of a second, the participant may have moved on and never seen the second d that required marking. Further research on why this happens is desirable.

McEwen (2007) describes stress as an experience that is "challenging and emotional." While the PFA may have been challenging for some of the participants, the likelihood of it being emotional is low, and certainly no comparison to the fireground. Using McEwen's (2007) definition, there was no stress introduced into the PFA. The research from Gasaway (2010), Bertomen (2008), and Singer (2012) indicate that the body's response to stress limits memory, affects focus, and causes other cognitive hardships. However, since there was no stress introduced, when attempting to report how the PFA answered the question of how external distractions affect focus and performance the results are inconclusive. The math portion revealed the number of incorrect answers was substantially greater with distractions. However, the D2 portion revealed the opposite. Further research is warranted into this, with expanded levels of distractions necessary as well as some way to add stress to the study.

When determining the steps other departments have taken to improve the incident commander's effectiveness on structure fires, the greatest impact appears to be from adding an additional chief officer. The IC is required to perform many different tasks, and these tasks are often times overwhelming. Gasaway (2008) makes reference to the many distractions that are present on the fireground, and Ciarrocca and Harms (2011) believe incident commanders need to be "superhuman" to handle all of the responsibilities. The results of the survey indicate that nearly two-thirds of the participants agree with this assessment, and view an additional chief

officer as a necessity. Nearly 70% believe one chief officer is not sufficient, yet only 57% send a second chief officer.

In the departments that do send a second chief officer, they stated the benefits have been increased assistance to the IC, increased safety, increased accountability, and the ability to place command officers in supervisory roles. The reason being, as Coleman (2008) states, is that two brains are better than one. These are four improvements that will save the lives of firefighters and civilians. One area that should be researched further is the reasoning why more departments are not sending another chief officer to structure fires, especially if they have identified it as a need.

Even though NFPA 1710 (2010) section 5.2.2.2.5 states chief officers shall have aides assigned to them at emergency incidents, less than 40% of the departments provide an aide. Having an aide can be very beneficial according to Ciarrocca and Harms (2011). Not only can they assist the IC with basic functions, they can serve as a gatekeeper for people that migrate to the ICP. Bystanders and people congregating at the ICP are a distraction according to Gasaway (2008) and the MBFD Battalion Chiefs and Captains. Again, this asks the questions as to why are aides not being provided. It is surprising that the number of departments that provide an aide to the IC is so low when the literature reveals the importance of an aide.

The results of the description of the ICP are reassuring. The MBFD and over 75% of the fire departments surveyed have their command post tied to a vehicle with either the IC inside the vehicle or working from the rear of it. This follows NFPA 1561 (2008) section 5.3.7.1 that requires the ICP to be tied to a vehicle and in a fixed location. The worrisome portion of the results in this category comes from the "other" response. There were many responses that stated the ICP was set up in the front yard and the IC would move around. This violates NFPA

standards and was documented in the Asheville LODD as a poor practice that should not be conducted (National Institute for Occupational Safety and Health, 2012). Overall having 75% of the departments and the MBFD following the national standard is positive, but more needs to be done to educate those not following it.

Adding an additional chief officer and utilizing a fixed ICP at or in a command vehicle are two major steps other departments have taken that have increased the incident commander's effectiveness. This is also evident with the changes Charleston and Asheville have made since their LODD fires. The outcome of these changes, according to Chief Davis (personal communication, June 3, 2013) and Chief Burnette (personal communication, June 3, 2013) have been tremendous, and dramatically improved their incident management and overall fireground operations. Both Chiefs added that command training has become more of a priority and they are constantly training their command officers to help them improve. The training aspect is another portion that cannot be forgotten, especially by the MBFD as all of the command officers view the command training as inadequate.

The MBFD command officers all seem to share similar views on the ICS practices within the department. The common theme is the department is way ahead of where it used to be, but there is still room for improvement, especially in having a standard way of running incident command. They all agree that one person cannot handle all of the requirements of an IC, they have all felt overloaded as an IC, they all want an aide, they all believe the command training is inadequate, and all but one think an additional chief officer is needed on structure fires. The fact there is so much consistency speaks volumes that change is wanted, and when compared to the literature, is needed. Unfortunately the MBFD does not meet the NFPA standards with regards to IC support. The incident commanders are overly saturated with tasks, and this was a contributing factor in the Asheville LODD according to NIOSH (National Institute for Occupational Safety and Health, 2012).

The biggest differences of opinion are with the usage of staff officers that work days, 8:00 a.m. to 5:00 p.m., Monday through Friday. The command officers are split 50/50 on whether or not the day work officers should have pre-determined ICS roles, and two-thirds do not feel comfortable using them on fires. These two responses may refer back to inadequate training. The staff officers receive little to no command training whatsoever. If the training as a whole was to improve, and the staff officers were given pre-designated ICS roles and trained on those roles monthly, the survey results may be different. Since the command officers are not comfortable with the staff officers, having them training together would improve the comfort level. The AFD placed the training officers on 24-hour shifts and sends them to fires, which has proved to be very beneficial (M. T. Burnette, personal communication, June 3, 2013).

The list of tasks the MBFD command officers believe they are required to handle as IC is similar to what the Assistant Chief expects. The main difference is with some of the supplemental tasks such as setting up the link to the thermal imager and ensuring the video camera is working. With the list of tasks the incident commanders perform, it is easy to understand why they want an additional chief officer, an aide, and why they feel overloaded.

With all the tasks the IC is expected to perform, there is a good chance something will be forgotten. As Hallinan (2008) states, when a human attempts to multitask they are taking their attention from one task and giving it to another. When someone switches to a new task, the old task is forgotten in about 15 seconds. This means if an IC begins doing something other than managing the incident, in about 15 second the IC may forget what is going on or become too

focused on the new task that managing the incident becomes secondary. This is where things can really go wrong just like in Controlled Flight into Terrain.

The number one distraction the command officers cited was people coming up to the ICP. Again, as Ciarrocca and Harms (2011) state, if the MBFD command officers were to have an aide, the aide can help clear these people out of the ICP. As Chief Burnette (personal communication, June 3, 2013) stated is done in Asheville, the aide can handle working the phone and laptop computer, and doing other tasks to allow the IC to concentrate on the incident.

Another possible way to keep distractions to a minimum is through the use of a sterile command post. This is similar to the sterile cockpit rule that was discussed by Poulsen and Edkins (n.d.). The operations of the ICP in the MBFD are split 50/50 on whether or not the IC should stay in the vehicle. This is the same split result as the decisions Charleston and Asheville made on the topic. Charleston uses in-car command, Asheville, while it heavily considered it, does not. The Assistant Chief prefers the MBFD incident commanders to be at the rear of the vehicle. However, the results from the noise study illustrate that it is quieter in the vehicle. While in-car command may not always be the best option, but it should be studied in greater detail.

The MBFD command officers believe that to improve the incident commander's effectiveness more training needs to be conducted and a standard way of doing incident command be established. They also see the need for more assistance at the ICP. The easy part is having the command officers see the need for standardization of command practices. The hard part is actually getting them to agree on how to do it as everyone as their own way of doing it. This was apparent when watching the videos from the command vehicle camera.

The videos revealed that the incident commanders' perception of what they think they do and what they actually do is somewhat different and this researcher is included as well. One command officer was consistently in front of the vehicle, away from the ICP, even stumbling on hose. Leaving the ICP is against NFPA standards and has been documented as errors made at LODD fires by NIOSH. There were also numerous times that radio calls were made and the IC did not answer them. This relates back to Chief Davis' comments that when the CFD studied audio tapes they discovered missed transmissions, including mayday calls (personal communication, June 3, 2013). While no mayday calls were missed during the MBFD videos, it certainly leaves the window of opportunity open, and that may have catastrophic consequences for the department.

The need for assistance at the ICP is very evident from the videos. It appears, via the audio traffic, that the incident commanders struggle to maintain accountability on larger incidents. This may be from the incident commanders being outside the optimum span of control after the initial dispatch. There are so many things happening quickly, the incident commanders are working hard to maintain accountability and this is a recurrent theme with them, calling on the radio frequently to check accountability.

Finally, the videos confirm that the ICP is a collection point for people. When some command officers were in charge, there were limited fire companies approaching the ICP, and more when others were in charge. Regardless of who was in command, bystanders, police, and medical personnel all were asking questions to the IC. Another distraction heard frequently was the ringing of the Battalion Chief's cell phone, and as Dr. Piroch stated, a human cannot carry on two conversations at once (personal communication, April 24, 2013). This means when the IC

was talking on the phone, managing the incident and communicating with companies on the fireground became a lesser priority.

## Recommendations

The purpose of this research was to identify strategies that will aid the incident commander with the ability to increase their focus and effectiveness at structure fires. Based on the literature and the data collected, there are several steps that can be taken to achieve this goal.

The first step to be taken is to standardize the command practices within the MBFD. The command operations must be the same across the board and should not differ between shifts or officers. The entire command staff of the department must put egos aside to build continuity in command and control efforts.

Second, the department needs to implement a proactive training approach in incident management. The Battalion Chiefs must use their expertise and experiences to provide training every month to the company officers on their shifts. The training should consist of tabletop drills, video simulations, and ICS training during live fire burn drills. Also, the Battalion Chiefs should be utilized to administer command training to firefighters and engineers every quarter. Their knowledge and real world experiences will help supplement the delivery from the training division.

The Battalion Chiefs and Captains need to receive training as well. They should be encouraged to attend outside training in settings such as the National Fire Academy and professional conferences. The department also needs to provide them training, which should be taught by the Assistant Chief since he supervises them. Non-punitive reviews of video and audio from fires the department has responded to will also be extremely valuable. The third enhancement that will increase the incident commander's effectiveness and focus is adding a second command officer at fires and implementing a command team concept. The results of this research overwhelmingly support the need for a second chief officer on structure fires. Within the MBFD, this can be accomplished by placing the Captain in a command vehicle and have them respond to structure fires. The use of the field incident technician in the Phoenix Fire Department is the perfect model for the MBFD to use. The Captain can assist with daily administrative functions, and work at the ICP as an aide to the IC on emergencies. Adding the Captain to the ICP will allow for a more effective incident management tool under the theory that two brains are better than one. Also, the Captain will be able to handle some ancillary tasks that will allow the IC to remain focused on the incident with limited distractions.

The final step that will improve the incident commander's focus and effectiveness is to sterilize the ICP. The decision of whether to keep the IC in the vehicle or at the rear of the vehicle should be examined by the department. Regardless though, the department should establish a policy that no one may assemble at the ICP except for members of the command team. Company officers that need to talk to the IC must do so via the radio. The policy should also include a no conversation section. The no conversation section is directed at the ICP itself and means no conversations will occur at the ICP unless it directly relates to the incident. Command team members at the ICP should focus on managing the incident, not discussing a topic unrelated to it.

The other portion of the policy will not allow the IC to field any phone calls before the incident is placed under control. When off-duty chief officers receive notification of a working structure fire, they shall listen to their radio to get details on the fire. They may elect to respond

to the fire and report to the ICP and join the command team, however no phone calls to the IC will be allowed. Off-duty chief officers must understand these phone calls are a distraction and shall not be made. If the IC needs something from someone off-duty, the Captain at the ICP will make the phone call.

With the implementation of these recommendations, the MBFD can make significant improvements to the performance of incident commanders on structure fires and hopefully reduce the risk of injury or death to both firefighters and civilians.

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Appendix A: Yerkes-Dodson Curve. Performance increases as arousal increases to a certain point. Once arousal becomes too great, performance decreases.



Appendix B. Curriculum Vitae and interview summary with Joan Piroch.

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## Education

- Ph.D., 1982, Psychology, University of South Florida, Tampa FLA Dissertation: The Effects of Variability of Tone Frequency and Task on Habituation of the Orienting Reflex in Humans. Major Professor: Dr. H.D. Kimmel
- M.S., 1974, Psychology, Western Washington University, Bellingham WA Thesis: The Effects of Circadian Rhythms on Tonic Immobility in Chicks. Major Professor: Dr. R.W. Thompson
- B.A., 1972, Liberal Arts, Slippery Rock University, Slippery Rock PA

## **Professional Experience**

- 2009-present, Professor of Psychology, Coastal Carolina University
- 2007-2009-Professor of Psychology and Chair, Department of Psychology and Sociology, Coastal Carolina University
- 2005-2007, Interim Dean, College of Natural and Applies Sciences, Coastal Carolina University
- 1992-2005, Professor of Psychology and Chair, Department of Psychology and Sociology, Coastal Carolina University
- 1988-1992, Associate Professor of Psychology and Chair, Department of Psychology and Sociology, Coastal Carolina University
- 1982-1988, Assistant Professor of Psychology, Department of Psychology, Coastal Carolina University
- 1981-82, Visiting Adjunct Instructor, Department of Psychology, Northwest Missouri State University, Maryville MO
- 1980-81, Adjunct Instructor, University of South Florida, Tampa FL
- 1977-80, Graduate Student Instructor, University of South Florida, Tampa FL

## Publications

• Huelsman, M.A., Piroch, J., & Wasieleski, D. (2006). Relation of religiosity with academic dishonesty in a sample of college students. *Psychological Reports*, *99*, pp. 739-742.

NOTE: This article was also published in L.S. Yyne (Ed.) <u>A Cross Section of</u> <u>Educational Research: Journal Articles for Discussion and Evaluation, Fourth Edition</u>, 2008, pp. 43-44.

• Sanders, S.L., Piroch, J.F., & Tomczyk, C. (2006). Creating an interdisciplinary community of inquiry on campus. *The Department Chair: A Resource for Academic Administrators*, 6, No. 3, pp. 21-22.

## **Conference Presentations**

- Piroch, J.F. 20 years of chairing: By the numbers. Association of Heads of Departments in Psychology, Atlanta GA, December 2007.
- Piroch, J.F., & Palm, L.J. *Involving psychology majors in a university-wide celebration of inquiry*, <u>Southeastern Psychological Association Annual Meeting</u>, Nashville TN, April 2005.
- Piroch, J.F., Sanders, S.L., & Tomczyk, C. *Creating an interdisciplinary community of inquiry on campus*. <u>Twenty-second Annual Academic Chairpersons Conference</u>, Orlando FLA, February 2005.
- Palm, L.J., & Piroch, J. *Enhancing preparation for a senior research course*. <u>Southeastern Psychological Association Annual Meeting</u>, Atlanta GA, March 2004.
- Piroch, J.P. *Chairing a department: The good, the bad, and the ugly.* Presentation with G.D. Goedel (Northern Kentucky University), A.K. Hess (Auburn University at Montgomery), and R.A. Smith (Kennesaw State University). *Thinking about being a chair? 50+ years of advice from psychology department chairs.* <u>Southeastern</u> <u>Psychological Association Annual Meeting.</u> Atlanta GA, March 2004.
- Piroch, J. Surviving budget cuts: Managing budgets during lean times. Association of Heads of Departments in Psychology, Atlanta GA, December 2002.
- Piroch, J. *Seasoned chairs: Been there, done that.* <u>Association of Heads of Departments</u> in Psychology, Atlanta GA, December 2001.
- Sanders, S.L., Palm, L.J., & Piroch, J.F. *What stories tell us: A linquistic analysis of freshmen autobiographies.* <u>Southeastern Conference on Linquistics LXV</u>, Atlanta GA, November 2001.

## **Workshop Participation**

- *The Psychology of Evil: The Lucifer Effect in Action.* South Carolina Psychological Association Spring Conference, April, 2008 (2 CEUs earned).
- *Neuropsychology for the Clinical Psychologist*. South Carolina Psychological Association Spring Conference, April, 2004 (3 CEUs earned).
- *Teaching and Technology*. South Carolina Psychological Association Spring Conference, April, 2003 (6 CEUs earned).
- Master Teacher Workshop. Coastal Carolina University, December 2002.
- *Grant Proposal and Review: The "Secrets" of Grant Review Criteria.* South Carolina Psychological Association Spring Conference, April, 2002. (3 CEUs earned).

## **Reviewer:**

Invited reviewer for feasibility study in the Department of Criminal Justice at UNC-Charlotte for new program. Fall 2007.

Invited reviewer for undergraduate student abstracts submitted in consideration of presentation at the <u>2007 Big South Undergraduate Research Symposium</u>, Coastal Carolina University, Conway SC.

Invited reviewer for W.W. Norton, textbook proposal for <u>Psychology: Unity and Diversity in a</u> <u>New Millenium</u>, by Michael Gazziniga and Todd Heatherton, spring 2003.

#### INCIDENT COMMAND EFFECTIVENESS

Served as external reviewer and review committee chair for three program reviews in the Department of Psychology and Sociology at Georgia Southwestern State University in Americus GA as part of the Board of Regent's mandated comprehensive program review process, spring 2003.

Invited reviewer of papers submitted for the graduate student research award competition for cross-cultural psychology, <u>Southeastern Psychological Association Annual Meeting</u>, New Orleans, LA, March 2003.

Invited reviewer of papers submitted for the graduate student research award competition for animal/biological psychology, <u>Southeastern Psychological Association Annual Meeting</u>, Orlando FLA, March 2002.

1. How does do external distractions affect focus, especially on the fireground?

- Stress definitely interferes with decision-making, focus, and attention. There is a lot of stress on fires. The fire itself is stressful, the life threat, and the safety of firefighters
- There are "limits to attention" and people can divide attention when the inputs are low on stress. For example, we can drive, talk on the phone, and listen to radio at same time. But when the inputs become too stressful the amount of attention division is decreased. That is why people turn down the radio when they are lost or fighting traffic.
- We cannot process more than one input when the sources are important. For example, if we are on the phone in an important conversation and someone walks in with something else important, we can only process one of them at a time. When shifting inputs and doing other tasks we loose focus on something else.
- I would say that we cannot attend to all things on a fire, it's simply psychologically impossible as there is too much happening.
- Visually we can process multiple things at a time. That is parallel processing, we can watch people walking, see cars, etc. while driving. Auditorially we cannot parallel process. Hearing is a serial process which means we can only do one thing at a time. If you try to do more than one thing when you are trying to listen there are multiple auditory streams and it is limiting. If we are using visual and auditory together, there is no telling which will take preference. It's highly individualistic and event specific. If you see something and then here your name, you will begin to hear actively.
- I do not truly think there is any way to prepare for chaos on the fireground. You cannot simulate the real stress and physical distractions. You can get good at it through automatic processing, being able to do something b/c you've done it so much such as walking and talking at the same time. However, you may have to fight this response, because everything is different and no two fires are the same, and this response may lead

to false sense of security and doing something you've done in the past but should no do on the current event.

• Anything that interferes with attention will shift your focus and attention. The distraction may be so bad that you can't get back to the real focus. For example, a student was distracted by landscapers outside working while she was giving a presentation. She was so distracted by the noise she completely lost her focus and where she was in her presentation. Stress and arousal is illustrated in the Yerkes-Dodson Curve. When we are aroused to a certain point we rise to the task and improve performance. But when the arousal becomes too high, performance will decrease. This is why students miss easy questions on exams when they are really nervous, or when military recruits in boot camp get confused on simple tasks such as raising the right or left arm.

Appendix C. Interview summary with John Arnold

Bachelor of Science, Indiana University, Bloomington, Indiana Doctor of Medicine, Indiana University, Bloomington, Indiana Residency at the Indiana University School of Medicine Hospital, Indianapolis, Indiana Practicing Partner, Michiana Anesthesia Care, South Bend, Indiana

- 1. Have you ever witnessed any medical errors due to people being distracted?
  - In medical school I saw some minor things go wrong. Especially when medical students were present. The doctors would be trying to teach the students while they were attending to a patient. It happened, but nothing extraordinary.
  - During residency I saw a lot more go wrong. Some of it had to do with residents being tired, I guess that's a distraction. It's also an entirely different topic. But most of the errors I saw where during traumas.
  - During trauma there are a lot of people coming in and out of the trauma room or bay. There is a lot of noise, some people get overly excited and yell. There is noise from the equipment and monitors. There is a sense of urgency as the patient needs to be stabilized to go to the operating room, or while in the operating room the surgeon needs to quickly control bleeding, stabilize them, etc.
  - Trauma cases can be tricky and involve more critical thinking a quick decisions. It's not like a medical patient. It someone is experiencing chest pains, there is a specific algorithm that is followed. Trauma is not that way. It's a stressful and urgent case that usually involves a lot of physical and mental distractions.
- 2. Do you find somewhere to get away from distractions before administering anesthesia?
  - Not usually. The routine cases I've done frequently and become conditioned to it. I'm not complacent, but I know what needs to be done because I've done it often.
  - I've never really given it much thought, but when doing something out of the everyday norm, I do. I will find a quiet place somewhere, maybe the anesthesia room, somewhere that allows me to concentrate. I do it if I'm doing odd calculations or dealing with pediatrics since most of the cases we deal with are adults. But, yes, I will go somewhere where I can think and be left alone.

#### INCIDENT COMMAND EFFECTIVENESS

Appendix D. Summary of interview with Josh Dickison.

Sergeant, United States Marine Corps, 2007-present Drill Instructor, Marine Corps Recruit Depot Parris Island, South Carolina Recruit Training Regiment, 1<sup>st</sup> Battalion, Bravo Company

1. The research I am conducting is about how external distractions can affect focus and performance of fireground commanders. Please share your experiences as drill instructor on how the stress and distractions in boot camp affect the recruit's performance.

- When they first arrive on the island they're met by a drill instructor that will shake them up by yelling a lot. They are kept awake for about 36 hours when they arrive. This is to create a high level of stress and anxiety.
- The first few days they are taught how to wear the uniform, the basic stuff needed before training begins. They are very nervous, they do not know what to do, and they are not used to being told what to do all the time. Some of them just freeze-up because they literally don't know what to do next.
- Once they meet their real drill instructors the training begins. Usually the new, lesser experienced drill instructor just runs around screaming, this is to shake the kids up and make them uneasy. They don't know what to do, but they watch what gets others in trouble and they try not to copy that.
- There's no doubt it is tough on them, they are constantly moving fast, everything they do is with speed and intensity. They get so overloaded sometimes they freeze. I've had college graduates that get so overloaded they cannot even open their mouth to answer a simple question. I've seen other kids just lock up and unable to move. It's not because they don't want to, it's almost like they can't.
- The older recruits seem to handle the adjustment better than younger ones. The younger ones usually feel sorry for themselves at first, at that keeps them even more mentally distracted.
- Eventually they do adapt. We spend every minute with them, and the drill instructors work between 100 and 120 hours each week preparing the training and actually carrying out the training.
- As the training cycle continues, roughly halfway through, we see confidence emerge, and this seems to take the place of the stress. They're still overloaded with tasks, but they actually believe they can handle it, and we've been training and drilling them repeatedly, so they become conditioned I think.
- The recruits are inspected by the battalion or company commander towards the end and there's a lot stress and pressure to perform well. They're definitely scared, but they are

confident too. They've been put through the scenarios by the drill instructors over and over, but when someone new stands in front of them, they get nervous.

- The noises do distract them, of course the yelling. The first time on the assault course the gunfire over their heads causes some be distracted from the tasks they're supposed to be completing, such as carrying a wounded buddy out. But really at that point, they've already been on the rifle range and heard gunfire, so it's really not as bad as you'd think. They've been conditioned to the sound of gunfire.
- The Crucible is a 54-hour culmination of recruit training. After they complete it, they are considered Marines. It tests their will and focus because they only get two meals, and very little sleep. They are broken into small teams, and have to work together to accomplish the tasks. By that point the end is near and they're highly motivated. Half through it, when they're hungry, tired, and dirty, we anticipate their performance to drop, but it actually improves. They come together as a team and use each other to get through it. Also, the drill instructor team is there to assist, we serve as mentors at that point.

Appendix E. Performance and Focus Assessment and results.

Worksheet #1 with no distractions.

Student Name:			Score:	
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5) 756	6) 668	7) 571	8) 923	
+ 838	+ 715	+ 946	+ 172	
9) 897	10) 638	11) 784	12) 827	
+ 431	+ 182	+ 625	+ 567	
· · · · · · · · · · · · · · · · · · ·				
13) 328	14) 709	15) 466	16) <b>387</b>	
+,456	- 398	+ 840	+ 934	
17) 798	18) 764	19) 586	20) 853	
+ 778	+ 893	+ 625	+ 428	
	-			

	Student Name:		_ ´`.	Score:	
	1) 963	2) 333	3) 2,64	4) 158	
÷	- 514	+ 489	+ 967	+ 363	
				· · · · · · · · · · · · · · · · · · ·	
	5) 615	6) 892	7) 803	8) 113	
	- 541	+ 158	- 326	+ 678	
			100	· · · · · · · · · ·	
	9) 696	10) 877	11) 713	12) 2 5 3	
	+ 536	+ 958	+ 407	+ 428	
	13) 598	14) 365	15) 415	16) 307	
	+ 816	+ 155	+ 797	+ 549	
	17) 857	18) 284	19) 859	20) 536	
	+ 655	+ 328	+ 876	+ 778	
		-			

Worksheet #2 with cell phone interruption and conversation.

Student Name:		- · ,	Score:
1) 231	2) 584	3) 672	4) 407
+ 479	+ 756	+ 352	+ 187
			<u> </u>
5) 915	6) 350	7) 128	8) 246
+ 717	+ 759	+ 282	+ 957
	· · · · · · · · · · · · · · · · · · ·		
9) 522	10) 241	11) 436	12) 119
+ 806	+ 688	+ 599	+ 987
13) 731	14) 162	15) 860	16) <b>397</b>
+ 586	+ 245	- 184	+ 793
			-
17) 516	18) 154	19) 426	20) 748
+ 454	+ 981	+ 763	- 689

Worksheet #3 completed while standing and bending over, but no distractions.

Student Name:			Score:
1) 123	2) 897	3) 697	4) 298
+ 961	+ 704	- 248	+ 288
5) 431	6) 557	7) 208	8) 615
+ 696	+ 885	+ 794	+ 968
		12.	·
9) 155	10) 725	11) 863	12) 658
+ 376	+ 475	+ 569	+ 764
13) 887	14) 993	15) 737	16) 465
+ 548	+ 149	+ 837	+ 366
17) 688	18) 748	19) 237	20) 512
- 595	+ 364	+ 493	+ 698
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Worksheet #4 with tracker cookies activated, youtube.com video, and heat over 80 degrees.

## D2 Test of Attention.

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Result of math portion.

		1. Under normal conditions; No distractions	2. Interruption with cell phone call & conversation	3. No distractions, completed while standing & bent over	4. Youtube video, cookies activated, & heat over 80 degrees
Partici	pant 1	1	1	0	0
Partic	pant 2	0	0	1	0
Partic	pant 3	3	6	3	18
Partic	pant 4	3	11	3	3
Partici	pant 5	5	14	5	4
Partici	pant 6	6	15	1	9
Partici	pant 7	1	2	2	0
Partici	pant 8	1	2	0	4
Partici	pant 9	0	0	1	1
Partici	ant 10	1	0	1	2
Partici	ant 11	3	5	3	4
Partici	ant 12	4	2	5	4
Partici	ant 13	6	13	1 -	7
Partici	ant 14	2	7	0	5
Partici	ant 15	0	5	1	2
Particip	ant 16	3	3	4	3
Partici	ant 17	7	6	2	4
Partici	ant 18	2	0	1	4
Partici	ant 19	0	0	3	2
Particip	ant 20	1	2	3	4
Partici	ant 21	0	2	0	3
Particip	ant 22	0	1	2	6
Particip	ant 23	1	1	4	7
Partici	ant 24	7	11	2	5
Particip	ant 25	3	16	2	8
Total in	correct:	60	125	50	109
Median I	ncorrect:	2.4	5	2	4.36

# Results of D2 portion.

	1. Normal; No Distractions	2. Normal; No Distractions	3. Backwards; No Distractions	4. Backwards; No Distractions	5. Normal; TV Show Playing	6. Normal; TV Show Playing	7. Backwards; TV Show Playing	8. Normal; Low Lighting	9. Normal; Low Lighting; cookies	10. Backwards; Low Lighting; cookie	11. Normal; No Distractions	12. Normal; Flashing Overhead Light	13. Backwards; No Distractions	14. Normal; No Distractions
Participant 1	3	1	0	1	2	0	1	0	0	1	1	2	2	2
Participant 2	3	3	2	2	3	2	3	2	0	0	0	1	2	1
Participant 3	3	3	2	5	5	4	4	4	2	3	1	4	4	5
Participant 4	1	8	4	6	4	6	6	7	7	6	5	8	5	5
Participant 5	4	0	3	1	0	2	1	0	0	0	1	0	0	0
Participant 6	3	0	0	1	0	0	3	0	1	2	1	1	2	2
Participant 7	0	2	0	0	2	2	1	6	1	1	2	2	0	1
Participant 8	8	6	4	4	5	3	3	3	3	3	3	2	3	4
Participant 9	4	4	0	3	3	1	3	4	2	4	3	5	2	4
Participant 10	6	6	1	2	4	4	2	4	3	0	3	3	1	2
Participant 11	3	3	1	0	1	0	2	4	2	2	3	0	3	3
Participant 12	6	3	0	3	3	2	4	4	1	2	5	3	2	1
Participant 13	6	4	4	6	5	5	6	4	5	6	4	4	7	4
Participant 14	2	4	2	7	6	2	6	5	2	3	3	2	3	4
Participant 15	8	8	8	10	9	6	10	10	8	7	9	7	7	7
Participant 16	9	10	9	8	8	9	9	12	12	10	8	9	9	8
Participant 17	2	3	4	6	3	1	5	7	1	2	2	5	5	7
Participant 18	6	6	1	5	4	2	5	3	2	6	5	4	4	3
Participant 19	0	3	2	2	4	4	1	2	3	5	2	5	3	4
Participant 20	8	8	2	5	8	1	4	6	3	4	2	7	6	8
Participant 21	1	2	0	0	1	0	0	1	0	0	2	0	1	2
Participant 22	9	9	7	10	2	5	11	11	7	6	4	8	1	8
Participant 23	3	3	4	4	6	2	5	5	1	0	4	2	4	5
Participant 24	2	3	1	1	2	4	4	0	1	4	4	3	4	4
Participant 25	7	7	2	6	5	6	4	2	5	6	2	3	4	5

Appendix F. Fire Department Incident Command Survey. Raw data is shown in parenthesis.

#### https://www.surveymonkey.com/s/XT3PBSY

- 1. Name of department and state where it is located.
- 2. In your opinion, can one person effectively handle all of the functions required of an incident commander on single alarm structure fires?

Yes: 42.8% (122) No: 57.2% (1
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3. In your opinion, is one command officer sufficient on structure fires?

Yes: 30.6%	(87)	No:	69.4%	(197)
	(*.)			()

4. Does your department send more than one command officer on first alarm structure fire assignments?

Yes: 57.7% (164)	No: 42.3%	(120)
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5. Does your department provide an aid/assistant to the incident commander at structure fires?

Yes: 38.9% (110) No: 61.1% (173)

6. Do you have pre-set ICS assignments/positions for day work administrative officers that respond to fires?

Yes: 34.9% (99) No:	65.1%	(185)
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7. Which of the following best describes your department's command post on structure fires?

25.4%	(72)	The incident commander remains inside the command vehicle
56.7%	(161)	The incident commander operates from the command vehicle, but on the
		outside. ie. the rear of an SUV or the trunk of a car
0%	(0)	The incident commander is in dedicated command unit such as a trailer,
		bus, RV, etc.
18%	(51)	Other, please explain

- 8. If your department has more than one command officer on structure fires, what has the benefit been?
- 9. If your department has made any operational changes to aid the incident commander's overall command and control functions please explain.
- 10. Which of the below describes your department's ability to provide a safety officer on the initial structure fire assignment.

21.3% (60)	We send a dedicated officer that serves as the safety officer
2.5% (7)	We send a dedicated fire company to serve as the safety officer(s)
19.1% (54)	The second arriving command officer serves as the safety officer
5.3% (15)	A designated safety will respond off-duty on the initial assignment
6.4% (18)	A designated safety officer will respond off-duty if requested
14.5% (41)	We usually do not use a safety officer unless it's a multi-alarm fire
30.9% (87)	Other, please describe

11. Which of the following best describes the actions of a higher ranking chief officer when they arrive on scene of a structure fire.

21.8% (62)	They assume command
50% (142)	They provide assistance and guidance to the IC at the command post
2.1% (6)	They assume the role of a group/division supervisor
1.8% (5)	They do not inject themselves into the ICS framework at all
24.3 (69)	Other

Alabama, Daphne Fire Department Alabama, Madison Fire Department Arizona, Glendale Fire Department Arizona, Mt. Lemmon Fire District Arizona, Tempe Fire Department California, Central Fire Authority of Sonoma County California, Five Cities Fire Authority California, Fullerton Fire Department California, Lompoc Fire Department California, Los Angeles County Fire Department California, North Tahoe Fire Department California, Redondo Beach Fire Department California, Sonoma County Fire & Emergency Services Colorado, Denver Fire Department Colorado, Loveland Fire Rescue Authority Colorado, North Park Fire Rescue Authority Colorado, South Metro Fire Rescue Authority Colorado, Westminster Fire Department Florida, Coral Springs Fire Department Florida, Destin Fire Department Florida, Islamorada Fire Department Florida, Kissimmee Fire Department Florida, North Port Fire Rescue Florida, Pensacola Fire Department Florida, Pompano Beach Fire Rescue Florida, Tampa Fire Rescue Georgia, DeKalb Fire Rescue Georgia, Fulton County Fire Rescue Georgia, Pooler Fire-Rescue Hawaii, Kauai Fire Department Idaho, Coeur d'Alene Fire Department Illinois, Carpentersville Fire Department Illinois, Hanover Park Fire Department Illinois, Skokie Fire Department Indiana, Auburn Fire Department Indiana, Clay Fire Territory Indiana, Elkhart Fire Department Indiana, Huntington Fire Department Indiana, Lafayette Fire Department Iowa, Cedar Rapids Fire Department Iowa, Newton Fire Department Kansas, Coffeyville Fire Department Kansas, Leawood Fire Department Kentucky, Danville Fire Department Kentucky, Florence Fire-EMS Kentucky, Lyndon Fire District Louisiana, Lafayette Fire Department Louisiana, St. Martin Parish Fire District Maine, Camden Fire Department Maryland, Baltimore City Fire Department Maryland, Montgomery County Fire and Rescue Service Massachusetts, Granby Fire Department Massachusetts, Merrimac Fire Department

Alabama, Gulf Shores Fire Rescue Alaska, Fairbanks Fire Department Arizona, Mesa Fire and Medical Department Arizona, Phoenix Fire Department Arkansas, Fayetteville Fire Department California, El Segundo Fire Department California. Fresno Fire Department California, Georgetown Fire Department California, Los Angeles City Fire Department California, Morgan Hill Fire Department California, Pasadena Fire Department California, Redwood Fire Department California, Vieias Fire Department Colorado, Greeley Fire Department Colorado, North Metro Fire Rescue District Colorado, Poudre Fire Authority Colorado, West Metro Fire Protection District Florida, Boynton Beach Fire Rescue Florida, Davenport Fire Department Florida, Hillsborough Fire Department Florida, Jacksonville Fire and Rescue Florida, Miramar Fire Rescue Florida, Palm Harbor Fire Rescue Florida, Pinellas Park Fire Department Florida. Sunrise Fire-Rescue Florida, No department name given Georgia, Forsyth Fire Department Georgia, Gwinnett Fire & Emergency Services Hawaii, Hawai'i Fire Department Hawaii, Maui Fire Department Idaho, Meridian Fire Department Illinois, Effingham Fire Department Illinois, Moline Fire Department Illinois, Streamwood Fire Department Indiana, Carmel Fire Department Indiana, Decatur Fire Department Indiana, Evansville Fire Department Indiana, Indianapolis Fire Department Indiana, Purdue Fire Department Iowa, Des Moines Fire Department Iowa, Sioux City Fire Department Kansas, Consolidated Fire District #2 Kansas, Newton Fire-EMS Kentucky, Erlanger Fire-EMS Kentucky, Frankfort Fire and EMS Kentucky, Winchester Fire-EMS Louisiana, New Orleans Fire Department Maine, Augusta Fire Department Marvland, Anne Arundel County Fire Department Maryland, Hagerstown Fire Department Massachusetts, Georgetown Fire Department Massachusetts, Halifax Fire Department Massachusetts, Northborough Fire Department

Massachusetts, Pittsfield Fire Department Massachusetts, Southwick Fire Department Massachusetts, Wilmington Fire Department Michigan, Brownstown Fire Department Michigan, Detroit Fire Department Michigan, Grand Traverse Metro Fire Department Michigan, Midland Fire Department Michigan, Rochester Hills Fire Department Michigan, No department name given Minnesota, Chanhassen Fire Department Minnesota, Grand Rapids Fire Department Minnesota, Mankato Fire Department Minnesota, St. Paul Fire Department Mississippi, Jackson Fire Department Missouri, Battlefield Fire Protection District Missouri, Eureka Fire Department Missouri, Liberty Fire Department Montana, Missoula Fire District Nebraska, McCook Fire Department Nevada, Clark County Fire Department Nevada, Reno Fire Department New Jersey, Clifton Fire Department New Mexico, Los Alamos Fire Department New York, Fayetteville Fire Department North Carolina, Asheville Fire Department North Carolina, Chapel Hill Fire Department North Carolina, Chicamacomico Banks Fire Department North Carolina. Durham Fire Department North Carolina, Hyattsville Fire Department North Carolina, Kill Devil Hills Fire Department North Carolina. Morrisville Fire-Rescue North Carolina, Raleigh Fire Department North Carolina, Rocky Mount Fire Department North Carolina, Statesville Fire Department North Carolina, Wilmington Fire Department Ohio, Ashland Fire Division Ohio, Colerain Fire & EMS Ohio, Dayton Fire Department Ohio, Jackson Township Fire Department Ohio, Steubenville Fire Department Ohio, Whitehall Fire Department Oklahoma, Bethany Fire Department Oklahoma, Oklahoma City Fire Department Oregon, Clackamas Fire District #1 Oregon, Newport Fire Department Pennsylvania, Alpha Fire Department (State College) Pennsylvania, Easton Fire Department Pennsylvania, Whitehall Fire Department South Carolina, Burton Fire Department South Carolina, Clarendon County Fire Department South Carolina, Georgetown City Fire Department South Carolina, Greenbrier Fire Department South Carolina, Greer Fire Department South Carolina, Horry County Fire Rescue South Carolina, Lady's Island-St. Helena Fire District South Carolina, Midway Fire Department

Massachusetts, Rockland Fire Department Massachusetts, West Springfield Fire Department Michigan, Bangor Fire Department Michigan, Burton Fire and Rescue Michigan, Fenton Fire Department Michigan, Lansing Fire Department Michigan, Rochester Fire Department Michigan, Sterling Heights Fire Department Minnesota, Burnsville Fire Department Minnesota, Eagan Fire Department Minnesota, Lakeville Fire Department Minnesota, Plymouth Fire Department Mississippi, Gulfport Fire Department Mississippi, Oxford Fire Department Missouri, Carthage Fire Department Missouri, Lake Ozark Fire District Missouri, West Plains Fire Department Nebraska, Fremont Fire Department Nevada, Central Lyon County Fire Protection District Nevada, Elko Fire Department New Jersey, Carteret Fire Department New Jersey, Secaucus Fire Department New Mexico, Santa Fe Fire Department New York, La Grange Fire District North Carolina, Calabash Fire Department North Carolina, Charlotte Fire Department North Carolina, Dare County Fire & Rescue North Carolina. Greensboro Fire Department North Carolina, Kernersville Fire Department North Carolina, Lewisville Fire Department North Carolina, Pinehurst Fire Department North Carolina, Roanoke Island Fire Department North Carolina, Southern Shore Fire Department North Carolina, Wake Forest Fire Department Ohio, Akron Fire Department Ohio, Barberton Fire Department Ohio, Copley Fire Department Ohio, Fairfield Fire Department Ohio, Napoleon Fire Department Ohio, Wayne Township Fire Department Ohio, No department name given Oklahoma, Mustang Fire Department Oklahoma, Tulsa Fire Department Oregon, Keizer Fire Department Oregon, Portland Fire & Rescue Pennsylvania, Chambersburg Fire Department Pennsylvania, Philadelphia Fire Department Rhode Island, Portsmouth Fire Department South Carolina, Charleston Fire Department South Carolina, Conway Fire Departent South Carolina, Georgetown County Fire Department South Carolina, Greenville Fire Department South Carolina, Hartsville Fire Department South Carolina, Irmo Fire District South Carolina, Lake City Fire Department South Carolina, Newberry Fire Department

South Carolina, North Charleston Fire Department South Carolina, Pelham-Batesville Fire Department South Carolina, Simpsonville Fire Department South Carolina, West Columbia Fire Department South Dakota, Sioux Falls Fire Department Tennessee, Memphis Fire Department Texas, Arlington Fire Department Texas, Conroe Fire Department Texas, Dallas Fire Department Texas, Lancaster Fire Department Texas, Round Rock Fire Department Texas, Victoria Fire Department Utah, Layton Fire Department Utah, Park City Fire Service Vermont, Brattleboro Fire Department Vermont, Norwich Fire Department Virginia, Alexandria Fire Department Virginia, Danville Fire Department Virginia, Goochland Fire Department Virginia, Harrisonburg Fire Department Virginia, Louisa County Department of Fire and EMS Virginia, Norfolk Fire & Paramedical Services Virginia, Richmond Fire & Emergency Services Washington, Bellingham Fire Department Washington, Duvall County Fire District #45 Washington, Lacey Fire District 3 Washington, Seattle Fire Department Washington, Yakima County Fire District 12 West Virginia, Wheeling Fire Department Wisconsin, Fond du Lac Fire Department Wisconsin, Janesville Fire Department Wisconsin, Oshkosh Fire Department Wyoming, Casper Fire-EMS Wyoming, Laramie Fire Department

South Carolina, North Myrtle Beach Fire Department South Carolina, Rock Hill Fire Department South Carolina, South Greenville Fire Department South Dakota, Brookings Fire Department Tennessee, Knoxville Fire Department Texas, Amarillo Fire Department Texas, Austin Fire Department Texas, Corpus Christi Fire Department Texas, Lake Travis Fire Rescue Texas, Lubbock Fire Department Texas, Travis County Fire Rescue Texas, Fort Worth Fire Dept. Utah, Ogden Fire Department Utah, Salt Lake City Fire Department Vermont, Burlington Fire Department Virginia, Albemarle County Dept. of Fire Rescue Virginia, Chesterfield Fire & EMS Virginia, Fairfax County Fire and Rescue Virginia, Hampton Fire Department Virginia, Henrico Division of Fire Virginia, Newport News Fire Department Virginia, Prince William Dept. of Fire & Rescue Virginia, Winchester Fire and Rescue Washington, Central Whidbey Island Fire & Rescue Washington, Eastside Fire & Rescue Washington, Lake Stevens Fire Department Washington, West Pierce Fire Department West Virginia, Morgantown Fire Department Wisconsin, Beaver Dam Fire Department Wisconsin, Howard Fire Department Wisconsin, Milwaukee Fire Department Wisconsin, Waukesha Fire Department Wyoming, Cheyenne Fire and Rescue Wyoming, Rawlins Fire Department

Appendix H. Interview summary with Mark Davis.

Charleston Fire Department Battalion Chief, Health and Safety Officer

- 1. Prior to the sofa store what did you send on structure fires?
  - 1 Assistant C and 3 Battalion Chiefs on shift.
  - 1 Battalion Chief respond to fires, the Assistant Chief would go if needed.
- 2. Since the LODD fire in 2007, what has changed?
  - 1 Assistant Chief and 4 Battalion Chiefs are on each shift.
  - They operate as a command team or command platform.
  - All command vehicles are same throughout the City.
  - The IC remains in the car. They may do a 360-degree walk-around, but that's usually done by someone else, because of the location many times they can't get a complete 360.
  - Battalion Chief sometimes has an aide, depending on staffing for the day.
  - The new response to fires is 2 Battalion Chiefs, and the Assistant Chief responds as a senior advisor and sits in car with IC.
  - 1<sup>st</sup> Battalion Chief is IC.
  - 2<sup>nd</sup> Battalion Chief handles accountability, or this can be passed to a company officer and then the Battalion Chief is the safety officer.
  - There are two chiefs in the car.
- 3. How has the switch to in-car command worked?
  - It was an adjustment, but once everyone on the fireground learned their role, the IC doesn't need to see the building, they learn to rely on the other officers.
  - It is much easier to hear the radio in the car.
  - The IC missed radio communications outside the car, and we found maydays have been missed while outside the car.
  - Once you get used to it you'll never go back.
  - We make people talk on the radio, people don't come up to car because what they say to IC may be of importance to others on the fireground too.
  - It is 100% better than being outside the car.
  - You wouldn't walk into the fire chief's office without knocking, so why would we want someone to interrupt someone's thought process when they're trying to make decisions with people in a hazardous environment.
  - It has allowed the command team to think on a strategic level, and let the company officers worry about the tactics.
  - It lets command officers be command officers and company officers be company officers.
  - Must remember that IC is overall responsible for everyone.

4. How has command training changed?

• We trained on in car command by pulling car into a stall and having a video on the screen in front and they ran the incident.

- 99% of our training is fire based. We are heavy into fire based training because that's where people die. We still do medical training, but people aren't getting killed on medical calls.
- We use Blue Card and are in the process of becoming a Blue Card regional training site.
- By end of 2014 all officers will have Blue Card certification.
- On average there is 2 hours per month of command training for officers and we do command simulations.
- On Fridays Battalion Chiefs are given command training.
- There is no real certification for becoming an IC, so that is why we're using the Blue Card credential, for some type of validation.

Appendix I. Interview summary with Scott Burnette.

Fire Chief, Asheville Fire Department Hired in 1995. Executive Fire Officer Program Graduate Chief Fire Officer Designation Associate Degree from Gaston College Bachelor's Degree from the University of North Carolina-Charlotte Master Degree from Grand Canyon University

- 1. Prior to the LODD fire in 2011, what did you send on structure fires?
  - We had 1 Deputy Chief and 2 Battalion Chiefs on shift.
  - Prior to incident we sent 1 Battalion Chief on fires.
  - We respond to a lot of working fires, mostly single family dwelling (280 fires annually).
  - There were roughly 3-4 large commercial fires a year, mostly defensive, but still only 1 IC.
  - There was only1 IC throughout the incident, and no built in measures to expand the incident management team (IMT).
  - Command officers had large amount of NIMS/ICS training, but no large IMT help on big fires. It was never a problem before July 28, 2011 because nothing bad had happened to that point.
  - At the LODD fire, the IC's span of control was shot, over 10 companies reporting to 1 IC and NIOSH report listed IC's task saturation as a contributing factor.

2. What changes were made after the LODD incident?

- We identified a firehouse with a 3-person ladder and engine company that had a low call volume but met response benchmarks. Merged those companies into one 4-person quint company.
- We took those extra people to bulk up command staff.
- Now we have 1 Deputy Chief, 3 Battalion Chiefs, 2 Safety/Training Officers (STO), and 1 deputy fire marshal trained in ICS and responds to fires in ICS role.
- Command fire response now is 2 Battalions, 2 STOs, 1 deputy fire marshal.
- 1<sup>st</sup> Battalion is IC.
- 2<sup>nd</sup> Battalion is a Division/Group Supervisor. They will don a SCBA and assume the supervisor of the most pressing need. At some point we will stop this on smaller fires, but now we are working to get more experience.
- 1<sup>st</sup> STO will be Safety.
- 2<sup>nd</sup> STO will be chief's aide a called a command technician.
- Huge increase in safety and accountability.
- There is no task saturation for IC, the Command Technician runs command board, radio, phone.
- Before the new system, the IC was supposed to e-mail city officials, notify of road closures, phone calls, collect accountability cards.
- We explored heavily in doing an in car command, but decided not to.

- They must establish a formal ICP, before it could be anywhere, front yard, wherever the IC was, now it has to be formalized.
- ICP is established at vehicle, usually at the rear.

3. How were you able to make the changes?

- No problems with buy-in from department.
- Some people were talking about the merger of the engine and ladder into the quint, but we lost no positions and added more command staff on fires. Added another company and 29 people are now sent on fire responses.
- We spent 12 months studying best practices from around the country and 60 employees volunteered to help.
- Community was devastated with LODD and supported the department.
- Council supported department and it was about \$40,000 increase in budget to make promotions for third Battalion Chief and STO out of a \$12 million budget.
- NIOSH report listed task saturation and gave support when asking for positions.
- We added a lot of drilling with chiefs.
- Began with tabletops and videos.
- Monthly drills are held at training academy with Battalion Chiefs at live fire drills with full blown ICS.
- We've partnered with demolition companies and are able to do training in buildings set to be demolished. Today we're at K-Mart.
- We found out that more simulations equaled more failure that was in documented in the After Action Review.

Appendix J. Survey for the MBFD Command Officers.

1. In your opinion, can one person effectively handle all of the functions required of an incident commander on working structure fires? Yes: 0 No: 6 2. In your opinion, is one command officer sufficient on structure fires? Yes: 1 No: 5 3. Would you want an aid/assistant to the incident commander at all structure fires? Yes: 6 No: 04. Have you ever felt overloaded with tasks while in command? Yes: 5 No: 0 \*Note: Question not given to the Assistant Chief 5. Would you want pre-set ICS assignments/positions for day work administrative officers that respond to fires? Yes: 3 No: 3 6. Do you feel comfortable with day work officer being plugged into your ICS structure at fires? Yes: 2 No: 4 7. Do you believe all officers on your shift are capable of effectively filling in various ICS roles? Yes: 2 No: 4 \*Note: The Assistant Chief was asked if all line officers in the department are capable of effectively filling in various ICS roles? 8. Do you believe there is adequate training within the department on incident management and command decision-making? Yes: 0 No: 69. Have the department's operating guidelines adequately established procedures for effective operations on structure fires? Yes: 5 No: 1 10. Do you assign a safety officer on all working fires? Yes: 0 No: 5 \*Note: Question not given to the Assistant Chief 11. What tasks as an IC are you expected to perform? \*Note: The Assistant Chief was asked what he expects from an IC?

- 12. What are some distractions that affect your critical thinking and/or decision making on the fire ground?
- 13. Explain how you set up ICS on your command post?
- 14. The department has recently added another support service company for ICS
- 15. How do you view the current ICS practices in the department?
- 16. How can we improve IC effectiveness?