September 2006

MODERN DRAGONS: THE MYTHOLOGY OF THE JET

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MODERN DRAGONS: THE MYTHOLOGY OF THE JET

An Interactive Qualifying Project Report

submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

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Date: March 5, 2006

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Abstract

The human mind is a remarkable device for summarizing and simplifying data with symbols and myths. Like people of ancient times we use myths to understand the things unfamiliar to us. Considering that technology is often hard to understand, one would expect there to be myths based around it. In this project the myths surrounding the jet aircraft were investigated. Data was collected from pop culture, sketches and interviews. Eventually this was condensed into a triptych of three acrylic paintings.

Acknowledgments

I would like to thank the following for their help in the creation of this project, without them it would not have been possible.

Provost William W. Durgin

Ryan Foltz

Keeley M. Stevens

Assistant Prof. Steven Taylor

And everyone who participated on the sketches

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Executive Summary

      The purpose of an IQP is to address the interactions between technology and society. The aim of this project was to understand more about how society relates with technology, in this case the jet aircraft.

      Technology has progressed so far and so fast in the last few centuries that it is impossible to keep up with all the changes it has made. Because of this people are now dealing with situations that are both very different from early human life and difficult to understand without years of experience. Some interpretations of mythology state that these are the conditions that foster the growth of legends and myths.

      With that in mind, it seems that there would be a wide variety of myths that people create to help them deal with technology. Though we pride ourselves on being a culture of logic, it is in human nature to create myths and stories to explain the world.

      I decided to study jet aircraft and the myths that surround them for several reasons. First, the act of flying is very alien to humans; we have only been able to fly for a century. Because of the alien environment many people are scared of flying and even those that enjoy flight tend to view it is as different from our regular two-dimensional lives. In addition, it is very hard to understand the physical concepts behind flight. Unless a person happens to be versed in aerodynamics, engine design, and mechanics they won't entirely understand just how it is that such a massive machine can float above the ground. Jets also happen to pervade society as well; most people have flown in jets and they are common sights in popular culture.

Studying modern mythology is a rather difficult task. It would be utterly futile to go up to an ancient Greek and ask them about their myths. In the same way, our myths are so ingrained in our psyches that we cannot bring them up and easily see them for what they are.

Therefore a rather roundabout method must be used to find the myths of jet aircraft in our culture. It may be impossible to directly access them, but the echoes of these myths should show up whenever we start to deal with jets. When we are asked to talk about or draw jets, some of the aspects of our myths should show through.

To find what people think of jets I used many different techniques. Mass media was an excellent way to study the jet and society. I looked at jets in movies, television shows, books, and art. I also interviewed a person who has a history in both piloting and aerospace engineering. This proved helpful in finding what it is that gets people interesting in flight, why people look up to contrails in the sky. Then I collected sketches from many different people after asking them to draw what they thought of when they thought of jet aircraft. The variety of the sketches provided a clear look into common trends and themes.

The main premise of technological portraiture, which was the basis of this project, is that qualitative data can be transformed into useful "portraits" which are writings or some other form of art. The hardest part in creating portraiture is ensuring a rigorous method of distilling the data. It is very easy to find trends in quantitative data, but not as easy with qualitative data. Nevertheless it can be done, and one of the goals of this project was to prove that a thorough analysis can be applied to qualitative data. To do this I took all the data and went through it, writing down themes and ideas that stuck out. Upon reviewing all this writing, I noticed that many themes were very similar, and I created a new list that grouped them according to similarities. When this was done I repeated the algorithm,

consolidating even more themes until I was finally left with three main ideas that portray what people thought of the jet aircraft.

The three themes that came out of the analysis were: the jet as an emblem of speed and fire, the jet as a faraway benign aerial being, and the jet as a tool for humanity. After deciding what would be included in the portrait, I had to decide how to make the portrait.

I've enjoyed making art all my life. I have a great amount of experience with ink and digital art, and I have previously made murals. For the portrait I decided to try something new and use acrylic paints on canvas. I have used acrylics before, but only on large areas like walls for murals. I wanted to try a new medium, something that would prove challenging. I also wanted to use acrylics on canvas because of their artistic effectiveness. There simply is something about having a work of art on a canvas that immediately captivates people, regardless of the quality of the painting on the canvas. It seems to be partly because of the size of canvases, as they tend to be physically large and imposing. The texture of the paint also helps with the physical presence of a canvas painting. There are drawbacks to the medium though; the sheer time needed to create large paintings limits what can be said. The quick drying nature of acrylics also tends to make blending hard. And of course, I am still very new to the medium.

Though art is generally thought of as an impulsive process where the artist acts on a whim, the steps to creating a painting are very rigid. After figuring out the three themes I wanted to illustrate I created small pencil sketches called thumbnails to see how the paintings would look before committing myself to a painting. Many different ideas were explored within the thumbnails and eventually one image was chosen over all the rest. Then the pencil sketch was redrawn on the canvas. Because of the size of these canvases, it is very easy to distort a picture. The pencil outlines provided a base for the paint to go on.

With the outlines in place, the paint could be added. Acrylics tend to be very thick and viscous. This make proper placement difficult unless they are thinned with acrylic medium. Unfortunately I mistook gloss for medium, which did not help to thin the paint at all. Despite all these setbacks the paintings came out fairly well, and I enjoyed working with acrylics.

The final form of the portrait is three paintings on canvas. The leftmost painting shows the warlike history of the jet, as a terrifying beast that spews fire and races across the sky. The rightmost painting shows the peaceful interpretations of the jet, as an ambassador from faraway places that soars through the heavens. In the center there is a child with their hand on the window of a passenger airliner. It is left up to the viewer whether or not the child is frightened or happy.

I learned a lot from this project. In addition to finding out how to work with a new medium I learned about how different and similar people's thoughts can be. There were many different interpretations of the jet, though many were based on the same theme. I was amazed when five people made strikingly similar sketches of contrails in the sky. I also learned how to look for and recognize symbolism, something I hadn't worked with before.

The final message I took away from this project is that the jet, though a wonderful machine, is still a just a machine and as such is an extension of ourselves. It is up to us to decide what we do with the jet, be it military monster or gentle transporter. In a way, what we see in the jet is what we see in ourselves.

Introduction

Mythology is an integral part of human culture. For millions of years we have created stories and symbols to help explain our world. Every single society that has ever existed has its own set of myths and legends.

So where are they today? Did we just leave mythology behind and replace it with purely rational thought? Of course not, humans today are just like humans of the past, and we have the same need for mythology.

It is true that scientific thought has taken much of the guesswork out of our lives. We now know why there are seasons and diseases; today we don't need mythological explanations for these things. The belief there is a rational justification for natural events is a central tenet of modern culture.

And yet, the same old need for the myth remains. We frown upon tales of Baba-Yaga or Rakshasas, yet urban legends and conspiracy theories still persist, filling up the gap that myths used to. People like to hear fantastic stories, people like to believe in a greater mystery and they like to speculate on it, even to the point of failing to do actual research in favor of story making. In this weird world where myths are simultaneously hated and desired our cultural legends take on elusive forms. They are harder to track down, harder to pinpoint and therefore less easily defined as myths.

That doesn't mean they are gone though. Myths may still very well be a cornerstone of society. Defining our beliefs would define our culture; they can show us the successes and failures of our own society. A subject so deeply ingrained in humanity cannot be ignored. Indeed some people define culture as "the shared beliefs of a group of people (Jones, 1996)."

In this case I am speaking of modern American culture and its mythology. That is the culture I have grown up in all my life. American myths are the ones I know best. It also would be rather futile to study French or Japanese culture when I lack the budget to visit those places and the experience to truly understand them.

To find our myths we must first understand what myths are and why we make them. According to Hans Blumenberg (1985), the objects we must deal with but do not understand are the progenitors of mythology. Myths are created for the purpose of explaining that which we do not know. Without these explanations we would fall into an endless state of anxiety, which is harmful to one's health. It is better to think we have control when we do not, as opposed to eternally fretting about tomorrow. A good example would be the tradition of crossing one's fingers for good luck. Of course crossed or uncrossed fingers don't have any effect on the outcome of events like a sports game miles away, but it still feels good to have some semblance of power, even if it doesn't work.

With this theory in mind the most obvious candidates for mythology would be things that we deal with everyday but do not entirely understand or control. Perhaps the greatest example of this is death and life. We do have many different mythologies surrounding death and the meaning of life; but our myths concerning these are usually relics of older eras. We have co-opted ancient myths as our own, and they are not truly ours. To better study the myths that are unique to our culture we must study situations unique to our culture. We must delve into things that are common, but potentially dangerous and misunderstood.

Technology is an all-encompassing theme in modern civilization. From the alarm clock that wakes us up in the morning to the light we turn off before bed, everything revolves around technology. We go to school in cars, eat heavily processed foods, communicate with

people halfway around the world, and heat our homes with a turn of a dial. Technology's effect on our daily lives simply cannot be overlooked.

But what do we know about technology? Sure, most of us know there's a rational explanation for why the car starts rumbling when the key is turned, but how many of us really know what is going on under the hood? How many people understand why computers do what they do? Most people have very little knowledge of technology not directly related to their work. Much of our lives is spent dealing with things that we do not entirely understand! And who could hope to understand it all? Nowadays it would be impossible for a person to be an expert in all types of technology.

And here is where Blumenberg's thesis comes in. We live lives surrounded by technology, but we don't know much about it. It would seem then, that technology and machines would be breeding grounds for myths.

And what sorts of myths would these be? Carl Jung ("Archetype," 2005) further expands upon Blumenberg's interpretation of myth, giving us the idea of archetypes as the fundamental basis of all later and similar concepts. In a way an archetype is the prototypical model that everything else is a mere copy of. It is a symbol at its most distilled. Every culture around the world has archetypes, they are the stories that show up again and again, the fears that we all have, and the things that make us uniquely human.

So not only do we have myths that serve to explain the unknown, we also have archetypes to fulfill. If there is indeed a "myth" of technology then it would likely fill both these roles. We would have myths built around a particular type of technology that would give us some semblance of control or understanding, and this same myth might follow previous archetypes found in earlier myths and stories.

There are so many different aspects of technology in our lives that it is far beyond the scope of one project to catalogue them all. Therefore one particular machine must be studied, to reveal as much as possible its contributions to modern myth.

In this case it shall be the jet airplane. The jet is an ideal generator of myths because of its widespread use and misunderstanding by the public. Many people do have a vague idea of how a car engine works or a little knowledge of programming, removing the mystery from everyday machinery. This understanding reduces the need for explanatory myth. Far fewer people understand exactly how flight and jet engines work. The power and danger of the jet airplane should also increase the potential for mythmaking. The fear of flying is very common and people may project such fears on the airplane. The jet airplane was picked over any other type of plane because it is unique to the modern culture and it exemplifies the traits airplanes already had. Jets are fast, powerful, and soar beyond sight. In a way, it would be possible to say that the jet is the "archetypal airplane." Though the jet was not the first aircraft, it exaggerates their traits; therefore it may be easier to find the myths associated with it.

The obvious symbolism of flying machines is not to be overlooked either. The airplane easily fits into the angel archetype, as a powerful and beautiful being of flight and air. The glorious feeling a pilot has during flight is just one more thing adding to the jet mythos.

There is also the negative symbolism associated with jets. They are fast fire-breathing objects, sometimes associated with war. The dragon archetype also fits this description.

Mythology is far from dead, in fact it survives and thrives today, and no small amount of it will be devoted to the jet airplane. If we are to understand anything about today's

society we must turn the microscope onto ourselves and study our myths. And where better

to start than with the jet?

Literature Review

To study the mythology of the jet airplane, one must first study the jet airplane and its history.

The earliest of aircraft were powered by propellers. With the aid of a power plant the propeller (essentially a vertical wing) rotates at high speeds. The shape of the propeller blade then acts as a wing would, creating a force perpendicular to its motion. This force pulls the airplane forwards, allowing the actual wings to generate enough upwards lift to oppose gravity.

The simple elegance of the propeller went uncontested for nearly four decades. However, the performance of a prop driven airplane had a nearly insurmountable limitation. As an airplane's speed approaches the speed of sound every protuberance creates a shock wave. Sound waves cannot move ahead of the aircraft (as their speeds are now the same) hence they build up and create a dangerous accumulation of energy. Once an aircraft gets past the "sound barrier" the danger diminishes. The tips of a propeller usually move far faster than the airplane itself. As they near the speed of sound they generate their own shock waves which interfere with the flow around the blade. Any propeller capable of operating at subsonic speeds drastically loses efficiency near the speed of sound. There are in fact propeller types that can work at supersonic speeds, but they suffer from poor efficiency at lower speeds.

The jet engine was conceptualized and created by two different people serving on both sides of World War II (Bellis, 2005). Sir Frank Whittle (British) and Dr. Hans Von Ohain (German) developed the idea of a turbojet. While Sir Whittle patented the idea first it was the Germans who built the first jet aircraft based on Dr. Ohain's design.

The first jet-powered airplane was the Heinkel He-178. First flown in 1939 it proved that a jet engine was feasible. After numerous improvements the engine was put into use on the Messerschmitt ME-262 *Schwalbe* jet fighter. While still incapable of breaking the sound barrier the Schwalbe was nearly one hundred miles per hour faster than any allied counterpart (Jet Engines, 2005). Though it terrified allied pilots the Schwalbe proved to be too short ranged and too late in the war to make much of a difference. It is interesting to note that the first jet aircraft was a terrifying instrument of war. This may or may not be a part of today's myths concerning jets.

Though it failed to save the Germans in World War II the ME-262 heralded the beginning of the age of the jet engine. Near the end of the war the British built their own jet fighter, the Gloster Meteor. The Americans also built the P-80 and P-59 jet aircraft, but the extreme danger of operating them ensured they never saw combat. Accidents and crashes plagued the airplane (Bellis, 2005).

Once Germany was defeated, its ME-262's were captured and used to improve turbojet technology. The Americans created the F-86 Sabre while the Russians built the Su-9 and Mig-15. It wasn't until the Korean War that the first jet on jet combat occurred. There the Sabres battled with the Mig-15's. In the skies above Korea the jet asserted its superiority, no propeller planes could compete with it and only another jet could bring down a jet.

It took some time before jets managed to take over the commercial sector. They required more fuel, were much noisier, and required longer runways than propeller aircraft. The fact that it was a new technology with many unknown dangers also postponed its use.

The first passenger jet aircraft service was introduced by the British Overseas Aircraft Corporation in 1952. It was the De Havilland Comet 1 and it carried 36 passengers from Europe to Africa. However, several disasters caused people to doubt the safety of the Comet

and American companies decided to design their own passenger jets. The first ones were commissioned by Pan American Airlines and were the Boeing 707 and the Douglass DC-8. These aircraft would soon take over long distance flights, which they still do today. Due to its efficiency and ability to use short runways the propeller driven aircraft is still commonly used for shorter passenger flights (Siddiqi).

There are multiple types of jet engines. The crudest and earliest are called turbojets (Yoon, 2001). Rotating fans at the front of the jet pull in and compress air. This compressed air is passed along to a combustion chamber where fuel is added and ignited. The resulting exhaust is forced out the back of the engine where it provides thrust. As it leaves the engine the exhaust is forced over more fans which power the entry fans. To obtain short bursts of power an afterburner duct is often added to the turbojet. Fuel is injected into the air and combusted adding significant power at the cost of fuel. However, the turbojet engine is notoriously inefficient and loud, thus it is rarely used today.

A similar type of jet engine is the turbofan. In the turbofan the air is pulled into the engine through a large fan, then it is split into two parts (Yoon, 2001). Some air passes by the combustion chamber completely, adding thrust without expending fuel. The rest of the air is compressed, combusted, and used to turn the main fan like a turbojet. The "cushion" of uncombusted air acts as a muffler, making turbofans much quieter than turbojets. The thrust generated by this air also makes turbofans more efficient. Most airline jets and modern jet fighters use this type of engine. Turbofans can also use afterburners, and many modern jet fighters use turbofans with afterburners.

Related to the turbofan is the turboprop. Instead of covering up the main fan it is open to the air. Essentially the turboprop is a propeller powered by a turbojet engine. This

type of engine is common on smaller passenger jets. It is even more efficient than the turbofan, but it is noisier and cannot easily pass the speed of sound (Yoon, 2001).

The ramjet is both the fastest and simplest jet engine. Instead of using fans to compress air it simply relies on its forward motion to ram air into the inlet. Then fuel is added and ignited. Because it is the forward motion of the jet than pulls air in, it cannot start itself. Usually ramjets are accelerated with other means of propulsion, or (as in the case of the SR-71 Blackbird) they are combination of turbojet and ramjet called a turboramjet (Yoon, 2001). Ramjets operate best at extremely high speeds, the Blackbird can officially reach 3.5 times the speed of sound, though it is theorized it can travel even faster.

While there are many other variations upon the jet engine the preceding ones are the engines most identified with jets today, therefore they are of the most relevance to the topic. The turbofan, being the most common type, is the most relevant out of all the different types. Unless noted otherwise it can be assumed that the jets discussed in this project are turbofans.

The jet airplane did not appear without precedent. Previously the propeller aircraft ruled the skies. Many aspects of them are similar, and in studying the context the first planes were viewed in we may get a deeper understanding of the jet.

When the propeller driven airplane was first developed it was praised as a device that would connect the world and bring mankind into the heavens. The ability of the airplane to travel far and fast would theoretically allow people to learn about distant places, to bring aid to the needy, and to let people live in the country while flying to the city for work. Amazingly, architects even designed skyscrapers with runways on top (Corn, 1983).

To ensure the future superiority of American air power, children were exposed to and encouraged to take part in aviation activities. Hundreds of model making clubs and shops

opened around the country, all with the goal of producing "air-minded" children. By 1938 more than 120,144 children were involved in modeling clubs in Detroit alone (Corn, 1983)

In advertising and entertainment the airplane was a symbol for all that was fast, high, and mighty. The airplane was integrated into traditional religious celebrations, most notably when Santa was driven through Chicago in an Ercoupe airplane in 1946 (Corn, 1983).

Europe too felt the frenzy of excitement over the airplane. New art movements such as expressionism and futurism glorified the airplane. Expressionism tried to capture the feeling associated with flight. Meanwhile the Futurists worked hard to portray the speed and daring common to cars and aircraft. It is highly possible that the futurists would have also used the jet engine as a subject, had the movement still been around when the jet became popular. The jet is one of the fastest devices of today (the rocket is faster but less common) and its abundance of moving parts would have fit in excellently with futurist ideals of speed and motion. The futurist style of dynamic and powerful lines best demonstrated by the artist Umberto Boccioni seems well suited for portraying the jet engine (Osborne).

Appreciation for aviation hit a high somewhere around World War II. Pilots of fighters and bombers wrote poems comparing airplanes to beautiful women. One of the most notable is a poem concerning the P-38 lightning.

> Oh Hedy Lamarr is a beautiful gal,
> and Madeleine Carol is too.
> But you'll find if you query,
> a different theory
> amoungst any bomber crew.
> For the Loveliest thing
> of which one could sing
> this side of the Heavenly Gates,
> is no blonde or brunette
> of the Hollywood set,
> but an escort of P-38s.
> Sure, we're braver than hell,
> on the ground all is swell,
> in the air it's a different story.

We sweat out our track,
through the fighters and flak,
we're willing to split up the glory.
We'll they wouldn't reject us,
So Heaven protect us,
And until all this shooting abates,
give us courage to fight'em,
and another small item,
An Escort of P-38s!

The author is unknown, but the poem shows the faith and beauty attributed to airplanes (Davis, 1990). The fact that airplanes are compared with beautiful women is rather surprising in such a male-dominated age.

The aeronautical fanaticism so common in the first part of the century did not last forever. Somewhere around the 1950's airplanes were no longer as revered as they used to be. A combination of factors led to this falling out, namely the gruesome wars fought with airplanes, and the increased availability of air travel (Corn, 1983). People forget how special things are if they are abundant. In the same way that people today rarely know the value of food, people started to forget the beauty of flight. Of course, like anything else there are groups of people who are still enthusiastic about flight, but the movement is nowhere near as large as it used to be.

It was in this period that the jet became a viable piece of technology. The creation of the turbofan ended the days of the inefficient noisy turbojet. However, with the waning attention the public paid to aviation the jet was never lauded as the propeller was.

This created an interesting situation between society and the jet. Because the fervor over the airplane died down, people were no longer aware of the mechanics of flight. The fact that jets are far more complicated than propellers didn't help the misunderstanding. At the same time however, there was still the cultural history of the airplane left over. It had already crept into our religion and culture. Santa flew in an airplane, not on reindeer.

What exists today is both the commonplace occurrence of the jet airplane, a lack of understanding, and a history of attempting to fit the airplane into every aspect of society. Hans Blumenberg wrote that the creation of mythology was necessitated by the ordinary events that surround and impact us, but that are misunderstood. We create myths to explain things and ease our anxiety. The conditions today are primed for the creation of a jet mythology.

So what sort of mythology would be generated around the jet airplane? Generally our culture would frown upon notions that jet engines are actually powered by phoenix feathers, but deeper and more subtle myths might remain. There might be an inner mental picture of the jet, a sense of unease or resplendence. There might even be rumors of people being devoured by them. Perhaps the jet fulfills a Jungian archetype, as something that represents speed and power ("Archetype" 2005).

Considering the nature of the jet we might start to see what sort of myths it might foster. The jet engine is an enclosed shell, within which lie swirling blades, noxious gases, and explosive combustion that leaves a cone of scalding air out the back. Jets are loud and fly at great speeds. Occasionally there are accidents where people are sucked into them; some survive, while others don't. Essentially, it would seem that the jet fulfills the dragon archetype; a strange powerful beast that can't be entirely tamed. The notion of a dragon exists in almost every culture, lending credence to the idea that there is some deep seated need to believe in dragons. In Asia there is the lung, a powerful snakelike being that can be either beneficial or destructive. In Europe there was the fire-breathing dragon or wyrm. Even Africa had winged serpents that spat death upon those who dared to trespass into their territory ("Dragons," 2006).

People who work with jet airplanes also have the potential to become creatures of myth. Does the image of a robed expert tinkering away with arcane incantations and potions bring to mind a wizard, or an engineer? For what little most people know about science and scientists, it might as well be magic practiced by magicians!

But could there be even more myths and archetypes? The early airplane fulfilled many Christian beliefs about angels, being light airy beings that fly to the heavens. The intense joy of the pilots can also be likened to a religious experience. The airplane even became part of Christmas celebrations by carrying Santa in a parade! There is an incredible duality of the potential myths a jet airplane engenders. But which myth is true? Or can it be that the jet airplane fulfills both myths; that it is both angel and dragon, both preserver and destroyer?

With all this information it seems that society demands that there be a mythos concerning the jet. The tricky part is to figure out exactly what that mythos entails. What does the jet mean to society? Is there a subconscious image associated with it? And if so, how can it be represented?

Methods

Mythology was a hard subject to tackle. In our society myths are given negative connotations. People consider them foolish attempts by primitive people to explain the world, and tend to think themselves above such nonsense. Asking a person about their myths may offend them.

To avoid this problem some rather indirect methods must be used. People should not be asked questions that could offend them. Questions should also be clear and to the point.

Though the question of this project is "what image and role does the jet engine play in today's culture?" it cannot be asked the way it is. Our culture is so ingrained within us it cannot be directly accessed. In order to get to it some indirect routes must be taken. That is the one of the goals of this project; to experiment with methods of getting at people's unconscious feelings (such as those the have become our culture) and then portraying it.

My experience lies with visual communication. I've enjoyed and practiced visual art all my life. Though most portraiture is written I happen to be better at painting. Visual data will therefore have the most relevance to this project. Whatever questions are asked they should all eventually translate into the visual medium. Visual drawings made by other people would be very useful to this project, and would be easier to convert into visual information. Written or verbal adjectives and descriptions would also be useful.

To obtain visual data people were given a paper and asked to draw "what they think of when they think of a jet airplane." This was not the original version of that question, I tried several different wordings but they proved to be too confusing. These questions included "what are your inner thoughts on jets?" and simply "draw a jet." The first question was too vague while the second was too specific. The one I settled on is both the clearest and

easiest for people to understand and relate too. After asking the question it was stated that they were not required to stay within the realms of reality. They were encouraged to use their imaginations and to draw whatever comes to mind. The sketchers also needed to be encouraged if they feel that their drawing skills are not very good. Once the picture is done the visual representations can be analyzed for common themes and important symbols.

The medium the artists were drawing in was primarily crayon. Most people have fond memories of crayons from when they were children, and very little professional art has been made with crayon so there is less pressure to perform well. If crayon is unavailable pencil or pen may suffice, though there is a chance that the different medium will change the nature of the artwork. I know that my style changes depending on whether I am using pen or digital art, so it is not impossible that styles can change between crayon and pencil based art. Mediums that feel differently tend to produce different styles, i.e. the pencil is longer, more precise and easier to erase while the crayon is stubbier and more colorful.

Sometimes on the same paper as the drawings people were asked to write about jet airplanes. Those who didn't want to draw can write. This will also help to expand upon any themes that are found in the drawings. While most information comes from the drawings, words help to clarify any emergent themes.

Valuable information was also derived from interviews. However, the techniques used to gather data from an interview are very different from watching people sketch and sometimes encouraging them. In an interview the interviewer has the ability to change its course. If the subject is moving on a tangent that is not important to the question at hand, they can be guided back towards the original question. The interviewer also can ask the interviewee to clarify certain things, and eliminating misunderstandings. However, the interviewer must always be sure not to influence the subject in any way; otherwise the data

will become skewed. This delicate balance of guidance and non-interference is further developed in "The Art and Science of Portraiture" (Lawrence-Lightfoot & Davis, 1997).

No matter the method the data is gathered in, attention must be paid to the person as much as to the answer they give. A pilot's opinion of a jet is very different than the opinion of someone less interested in flight. For this reason the interviewee must be carefully chosen. Interviewing random people might help to show what the general public feels about jets; but most people won't have much to say about them. A better source of information would be interviews with people who are involved with jet aircraft. Why they are interested in jets, what changes they think jets have made on society, what they feel about jets; are all important questions to ask to figure out what the jet means to society both physically and mentally. A rather hard choice to make is whether the project will focus on what the average person feels about jets, or how someone who works with them feels. Ultimately it was decided that instead of focusing on one group, as much data as possible would be collected. Because it was easier to collect lots of sketches from lay people as well as aerospace engineers, sketches were collected from both. Because more information in general could be gleaned from a former pilot and engineer, it was they who were interviewed.

It is also important to protect the people who participate in this project. If they do not wish for their identities to be revealed they can remain anonymous. Only their responses were listed. The nature of this project is benign so there is little danger to participants; nevertheless any wishes for anonymity are honored.

Even more information can be found in preexisting works. If indeed there is a subconscious view of the jet it would only make sense that it would bleed into pop culture. While it is true that our unconscious is generally hidden, such an overarching part of our minds cannot be completely concealed. The subtle choices we make in our choices of lyrics,

paintings, and advertising reflect any archetypes or myths about the jet airplane. It only makes sense that the ideas surrounding the jet engine would make their way into other media and cultural outlets.

While the jet is referenced a great number of times in every sort of medium, only some depictions are useful to this project. Simply showing a jet as it is wouldn't be helpful at all since that doesn't have any connotations added on to it. Particular manners of displaying the jet (is it benign or fearsome?) and different symbols shown with it (flags, missiles, and flames are just some examples) will help show what people feel about the jet. Of course there may be writings specifically about what the jet means to society, these will be very helpful.

Once all the data is gathered it can be sorted and analyzed. Deciding what is relevant and what is unnecessary will be very important. Similar ideas will have to be grouped together, new concepts will have to be explored, and preconceived notions may have to be eliminated. Hopefully a single picture or series of pictures will emerge.

When it comes to the analysis of the data grounded theory will be used. Grounded theory is essentially the process of pulling information from qualitative data. The book "Basics of Qualitative Research" by Anselm Strauss and Juliet Corbin explains the processes involved in grounded theory and how to go about it (1998).

Once the data is gathered the first step in the process of grounded theory is describing the data. This step does not attempt to explain why the data is the way it is, instead it merely describes it. It is possible that one's opinion could enter into the description, but it should not skew the data in any way.

Conceptual ordering is the next step. The descriptions will be used to organize the data into categories. Depending on the properties of each bit of data, it will be sorted accordingly.

According to grounded theory the next step is to create the theory. The intent of this project however, is to portray a set of data in a new way, not to create theory. While I will probably come up with some of my own thoughts on why things are a certain way, the main part of this project will end in the conceptual ordering phase.

In the portrait making part of this project my own background will become important. I've always been fascinated by art. It is one of my favorite hobbies and over time I've learned a lot about it. In particular, I've been amazed by the symbolism inherent in art. What we actually see is far different from how our minds interpret it. The art of children and those inexperienced in art is a collection of symbols, more akin to writing than physical shapes. This symbolism is also inherent in the art of ancient cultures. Despite the fact that most Egyptian figures are drawn in profile, their eyes are shown as they would be facing head on. This is because when we think of eyes we think of how we see them, which usually is from the front. In most ancient art perspective, scale, and anatomy were distorted or even entirely ignored in favor of the idea or symbol. In my experience learning how to draw has primarily been unlearning my previous symbolic notions and trusting my eyes alone. Hopefully this experience in learning to distinguish between symbol and shape will help me find out the hidden messages in the art of the jet airplane.

The actual objects within pictures are very important. Most objects have symbolic meanings. Wings generally symbolize freedom and in a Christian interpretation the divine. Fire can be passion or destruction. One must be careful though, one symbol could have

different meanings for different people. The sketches gathered from the participants will be analyzed for these symbols. These can be seen in the Appendix.

While there will be some symbols that are easy to read, there is much more interesting data held within the composition of an art piece. The depiction of certain ideas must sometimes be shown in the way the artistic objects are arranged, not in what they are. For example, how would one show "love" in a picture? Love is an important concept, but it doesn't lend itself to immediate recognition in an image. The institution of art has already concerned itself with the task of showing feelings and ideas in a flat arrangement of pigments. The manner in which strokes are applied (hard and thick, or soft and careful) adds volumes of emotion to a picture. People also tend to associate certain colors with particular feelings; equally important is how colors are used in context with each other. A fading wash of blue against soft yellow tones will create a very different mood than bright blue against bright yellow. Composition can also lend a hand towards the display of emotion. Is the picture full of jarring shapes? Or is it composed of sweeping curves?

To begin the analysis I went through all the sketches, the collected data, and the interview and wrote down symbols and themes whenever they arose. Some themes were more common than others, and the less common ones were then removed or consolidated into larger themes. Then, I went through the themes again, trying to pick out common ideas, and I was left with about six different central ideas about the jet. Again, I analyzed these themes and came to the realization that most were talking about air, violent speed, and the experiences of humans on jets. Further looking back at my research I realized that these three themes paralleled the common nose art of eagles (air), sharks (violent power), and women (humanity). Confident that these were the ideas to pursue, I started making a series of thumbnail sketches to choose how to best illustrate the themes.

Once the important themes and symbols have been identified the final product can be started. The artistic process is mostly visual so it is hard to describe in words, nevertheless here is an explanation of my process.

First many small "thumbnails" will be made. Thumbnails are small pictures used to figure out the basic composition and dynamics of a picture. While I'm making the thumbnails I'll be thinking about how the composition affects the message of the picture. Essentially, it's a backwards process from what I will be using to see the meaning in someone else's picture. As much as I would like to say that I'll plan these out in my head, I won't. I may have a vague idea from all the information I have gathered, but a complete picture is far too much information to keep in a single mental image. The process involves putting down many lines and then picking the one best for my needs. This line will serve as the basis of the whole picture; everything will come off of that line.

These rough sketches allow me to figure out the setup of the paintings. Because there were three themes the triptych form was the best way to show them. Triptychs, which are sets of three paintings, are very common in art. Sometimes they show three separate ideas, but sometimes they are used to show a progression of ideas. The intent of this project was not to show a progression, so in this case the triptych would not have an element of time, instead it would have three ideas. The form of the triptych is important too. Upon looking at whether to orient the canvas' as portraits or landscapes, I realized that general profile of an aircraft is a horizontal cross, with the long thin wings intersecting with the shorter thin tail. Thus, I decided to make the two outer canvases oriented as landscapes, and the central one a portrait to mimic the profile of an airplane.

Next the colors and textures must be chosen. As has been stated before color is very important to the meaning of a picture so it must be picked carefully. In general there are only

two main colors to a picture, everything else will play off of them. These are the highlight color, and the lowlight color. The lowlight color is the atmospheric color, the one that pervades the picture. The highlights are the color of the light source and tend to draw attention to a particular part of the painting. These two main colors will be "nudged" in a certain direction to create what appear to be new colors. Few people realize that the green grass they see on a blue evening is actually blue in color, it just happens to be greener than everything else and therefore the mind sees it as green. Once the colors are deemed satisfactory they can be used as the basis for the actual painting.

The canvases used in this project are rather large, and thus the potential for distortion is great. To keep the same shapes that were used in the thumbnail a grid shall be used to transfer the information in pencil onto the canvas. Then the painting can start.

The larger blocks of color will be added first. Then the color gradients will be done. Eventually I'll work in smaller and smaller details until it is finished. The painting will be done in acrylic paints because of their adaptability and quick drying.

Preparing the canvases came next. After doing some research I found that many artists coat their paintings with a thick paint called gesso. The gesso smoothes out the rough canvas and makes it easier to paint on. I applied six coats of gesso to the central picture (which I decided to do first because it was most important). Though it did help somewhat, I decided that adding gesso took too much time for too little improvement. I did not gesso the other two paintings.

Before painting I used pencil to make a rough outline of where the paint should go on the canvas. It is easy to mess up when dealing with such a large canvas so proper planning is essential. Where symmetry is needed I used a ruler to properly align the pencil marks.

Once the pencils are satisfactory, the painting can begin. First, the base colors must be added. These follow the pencil lines and provide the basic shapes of the subject. After the base colors are done, smaller areas can be added. To create gradients and shades a small amount of paint is added to an acrylic medium. The medium dries clear and allows for a transparent color. I bought a small bottle of what I thought was acrylic medium for this project, only to realize that it was actually a gloss meant for covering the painting once complete. It did serve its purpose though, and illustrates how much there is to learn about acrylics. Between each layer of paint, careful attention must be made to whether or not the lower layer is dry; painting on a wet layer can bunch up the paint. When the paint is done a layer of gloss should be added to protect it.

There is the possibility of getting these paintings framed and displayed. Right now that is not the main goal of this project, but I may have to consider it later. Simple frames would probably be best, ornate frames tend to take away from the painting itself.

Results

The completed portrait can be seen above was done in triptych form, with each picture representing a different aspect of humanity's interactions with jet aircraft. In the center there is the hand of a small child in a passenger jet. They may be frightened and excited at the same time about flying. Are they waving at us or covering the window in fear? The paintings on either side of the center piece show the different thoughts of the child. The left shows a vicious monster, full of teeth and fire. The right shows a serene picture of a jet making clouds above the treetops. What the jet is for the child is, ultimately, the choice the child makes.
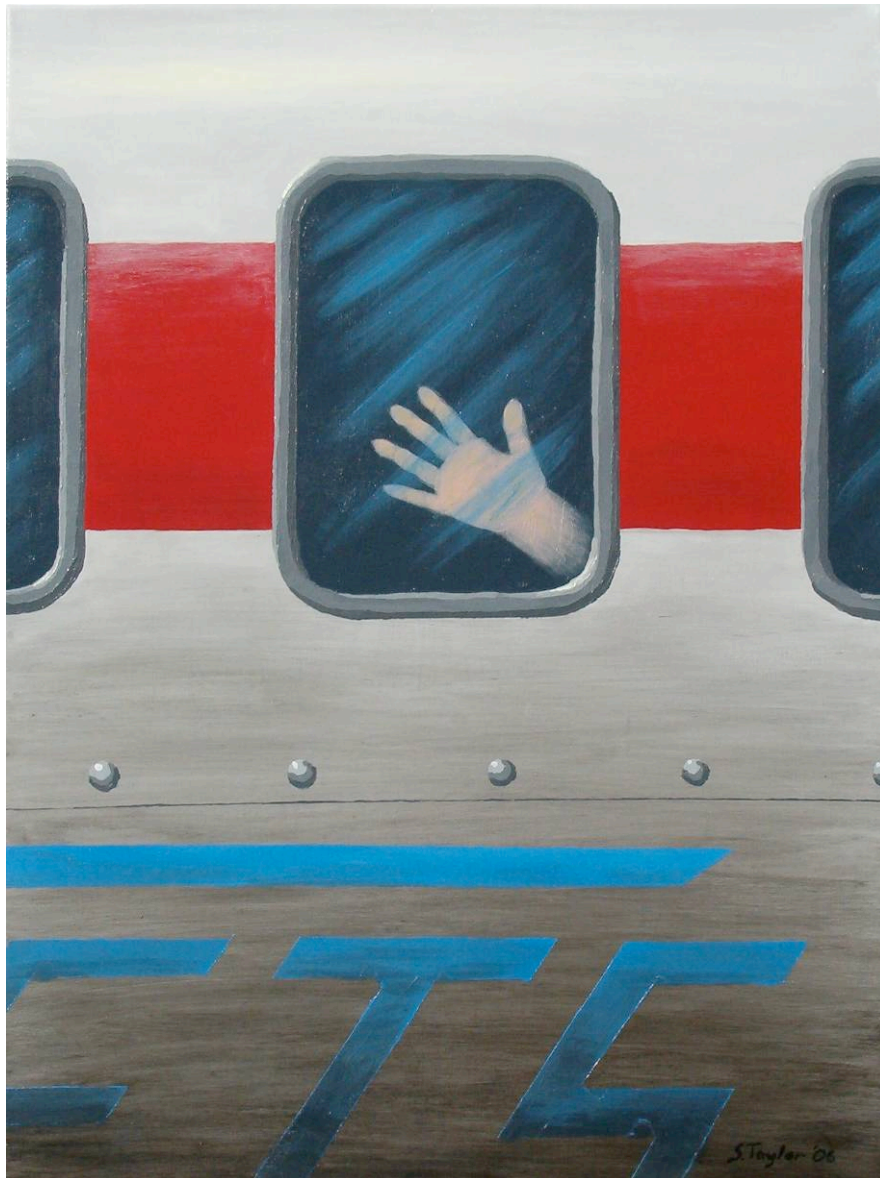
The central piece of the triptych is also the central theme. There is a small child inside a massive airliner. We can see the hand but not the face. I tried to make the exterior as metallic as possible, though most planes are painted people tend to think of them as constructs of steel and aluminum. One of my goals for this painting was to make it both lonely and claustrophobic at the same time. Though jets make their way across the empty sky by themselves, the experience of passengers tends to be that of being crowded together. Of course, one also cannot discount the excitement of flight, which is sometimes tinged with fear, so it is unclear whether the child is happy or scared.

The leftmost piece portrays the more violent aspects of jet technology. Though they serve many purposes jets were created for war and continue to serve as military vehicles today. To reference the powerful blades that have the unfortunate tendency of sucking people in and chewing them up, I gave the jet teeth. The teeth are also meant to hearken back to shark teeth painted on many fighter aircraft. The fiery exhaust simulates dragon's breath and the explosions of munitions. Also inherent to the jet is speed, which is represented by shock waves forming at the nose of each jet.

The right picture is the opposite of the left picture. Where the left painting is chaotic and jarring the left picture is serene and soothing. This represents the airliners trailing clouds across the empty blue sky, the pilot watching the expanse of earth and sky through the cockpit windows, and the feeling of flight.

Conclusions

Contrary to my original ideas there was no singular vision people had of the jet aircraft. With all the data I collected there seemed to be no coherent idea that could be illustrated with one drawing. Worried that my theories were wrong and that there were no myths concerning the jet I started to write down all the data I had in one place. It took up several pages, and seemed unrelated, but if I was to get anything useful I needed to simplify it. I managed to go through all the data and further condense it. I then did it a third time and was left with three different ideas, each of which served a different purpose. The pictures used in these interpretations can be seen in appendix 1.

The main idea was of people in jets. It conjured up feelings of cramped cabins, small portholes, the intense loneliness of being in a single small plane in the sky, the frightening and beautiful feeling as the ground falls away and the airplane takes off, a child waving goodbye or hello, the distant earth, the terror of turbulence, the droning roar of engines and wind. These were the thoughts that were found within the data and fit into the "passenger" myth.

Because the passenger myth had so many different permutations, I had to make sure that the portrait was vague and unclear. Then people could project their own feelings onto it, which is important because the passenger myth seemed to be the most personal of all the themes I found. To make it easy to interpret I reduced the jet and the person to smaller parts of the whole. Only a few windows of an airliner are showing, and only a childlike arm is visible in the window. The hand may be waving goodbye sadly or saying hello. There are a few bold painted stripes like airliner insignia to help distinguish it from other types of jets, but nothing to define it as any particular airline company. There are also several cut off

letters that may or may not read "JETS." The intent of this painting is left up to the viewer to decide.

The next theme that came up was the jet as an emblem of fire, violence, and speed. Some people liked to draw fighters with missiles and flames. To represent this I used a different style of art than on the other paintings. The colors are bold and bright, and the lines are sharp and angular. To further emphasize this I gave the jets teeth, large trails of afterburner flames, and shock waves forming at the front of the jets. The teeth were partly inspired by the shark teeth added to military aircraft throughout history. They also serve to remind people of the massive blades that compress air to allow the jet to fly. Unlike the central painting the meaning of this painting is clear, that there is a violent warlike history to the jet.

Of course, not all jets are military, and the information I gathered suggested that there is an opposing myth to the jet, a myth where the jet is seen as an angelic and beautiful aerial being. Time and time again in my data there came the image of a jet flying far overhead with contrails following it. There is something almost magical in seeing a metallic object take flight, it's the reason people learn to fly in their spare time and the reason children wave at small single engine planes in the hopes the pilot will wave their wings back. Regardless of the jets history as a military machine we should not forget that is has brought people closer together. This hope and feeling of lightness what was I wanted to portray in this picture. Unlike the left painting the colors here are subdued and peaceful. There are no harsh lines, only soft white lines for the contrails and layers of dots for the pine trees. The jet itself is distant, but the effects are very visible.

The arrangement of the pictures can sometimes be as important as the pictures themselves. I opted for the use of a three panel series (a triptych) mostly because there were

three ideas I had to illustrate. However, the triptych has long served in art as the usual setup for a group of paintings. For some reason three pictures are more attractive than two or four picture groupings. I also chose the triptych because it would allow me to have one central picture with two side pictures.

The orientation of the paintings is also important to the final effect of the piece. I noticed early on that the horizontal line with a thicker central body is the shape of the front view of an airplane. To recreate this in the triptych the outer canvases are horizontal while the central one is vertical. I doubt people will notice this, but even if it only affects them subliminally its purpose will be fulfilled.

The order of the paintings also affects the final meaning that people gather from them. The main picture had to be placed in the middle, but the left and right paintings could be on either side. Though there were many different interpretations of the jet, many seemed to have a sort of hopefulness to them. Because most people in our society read from left to right, I gave the benign painting the rightmost spot. That way, when people "read" the triptych the final impression will be that of hope.

Reflections

I learned a great deal from this project, about painting and myself. The paintings were not as good as I hoped they would be, but considering that I was figuring out the acrylic medium as I went along mistakes are to be expected.

Acrylics dry very quickly and are very thick. It is easy to accidentally build up ridges of unpleasant looking paint. The thickness also makes it had to do small details because the paint tends to go on the canvas in thick globs. This thickness also made it hard to mix new colors. I did use what seemed to be an acrylic medium to dilute the color and make it transparent enough to make gradients with, but it didn't work quite like I wanted it to. I realized near the end of the painting process that it was not a thinning medium that I was working with, but instead it was a gloss. Glosses are not meant to be mixed with paint; they are intended to be applied long after painting is done to form a tough protective sheet over the delicate paints. The fact that I was using the materials incorrectly was probably the main source of my frustrations. Upon doing more research I came across several websites that suggested that acrylics need to used with proper thinning agents and added to the painting layer upon layer. Unfortunately there are very few tutorials for acrylics on the web that I have found, and I'm still unclear on many aspects of the process.

Another snag in the painting process came from the smell of the paints. Acrylics are artificial chemicals, and therefore don't smell very good. It became very hard to work in a small dorm with just one window with the paint giving off enough fumes to cause headaches.

I intend to try to use acrylics again over the summer (in a well ventilated area), possibly in conjunction with my airbrush, and I hope to improve my skills with them. As

much as I enjoy working with ink and digital art, neither medium has the same physical presence as paint on a canvas.

The symbolism was another hard part of the project. Normally I put very little thought into the subjects of my art. I get an idea, I research it, and then I draw it. Nothing more has been required. Here, I had to plan out every aspect of my paintings. I had to add layers of symbolism and meaning, as opposed to my usual "three headed rabbits are cool, therefore I shall draw three headed rabbits" process. Perhaps the hardest part was anticipating the reactions of other people. Everyone comes with their own notions and feelings. These cannot be prepared for. Yet I must not make the mistake of putting too much of my own feelings into the paintings, lest they cloud the message. While it is true that many forms of art require the artist to engage their feelings and pour themselves into their art, that is not so in the case where the artist wants to portray a single clear message. Finding the balance of having symbolism without too much of my own ideas was rather tricky. Nevertheless I am intrigued by this sort of art and may attempt similar things in the future.

A phenomenon that worried me during the data collection process was how timid some people were when asked to draw. Even with assurances that the pictures would not be attributed to them or shown in full view people often balked at the idea of expressing themselves, or said that they could not think of anything to draw. Maybe it's because I have drawn all my life, but I simply cannot imagine being unable to express my thoughts. I suspect that people may view unique art as 'weird' and therefore undesirable.

The cohort approach to the IQP was very helpful. I have heard many horror stories of students forced to work with lazy partners or stuck alone on a project they don't know how to fix. Having two people along with the advisor that I could talk about the project with without having to depend on someone else made for a supportive environment. Without the help of

several people to critique my ideas and offer new thoughts I doubt the project would be as good as it was.

The technological portraiture process was also very interesting and surprisingly rigorous. Though I hoped to get a mostly unbiased view of what people thought of jets I fully expected that my own preconceived notions would dominate the project. Much to my surprise the results were far different from what I initially thought they would be.

Despite the mistakes and problems with the painting, I think the project was ultimately successful. It was surprisingly easy to get the major myths of jet aircraft after all the data was collected, and it appears that people are finding the symbolism of the portraits significant. The technical quality of the paintings is good, especially considering that I was learning. I had a great time with this project and I am very glad I was able to do it.

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Appendix
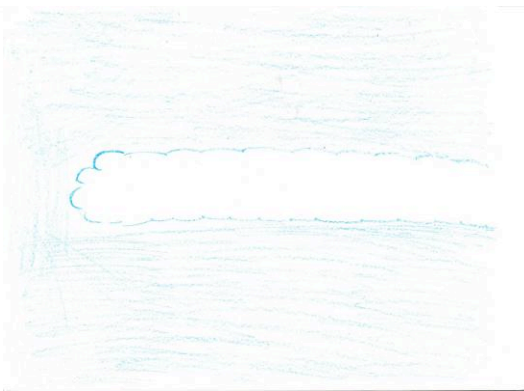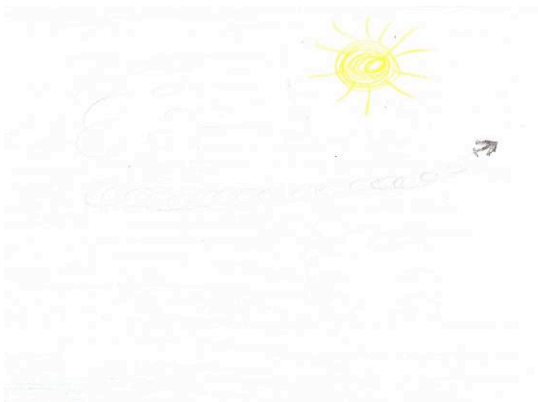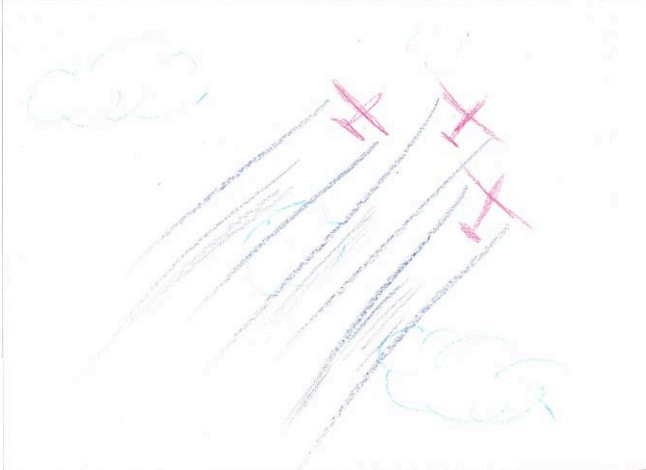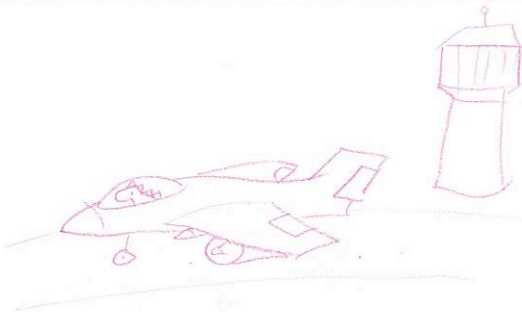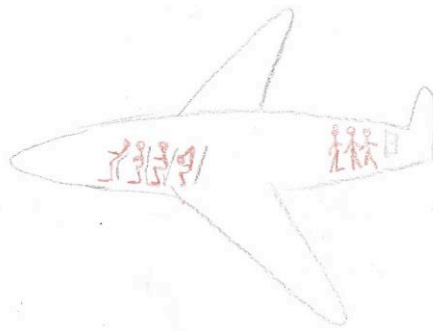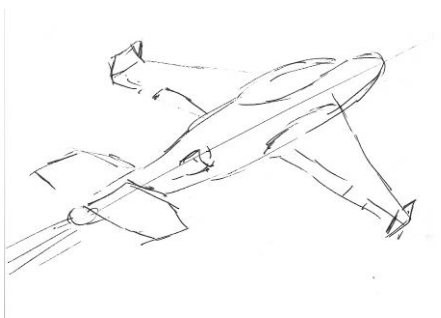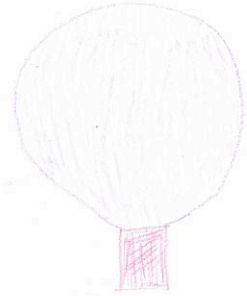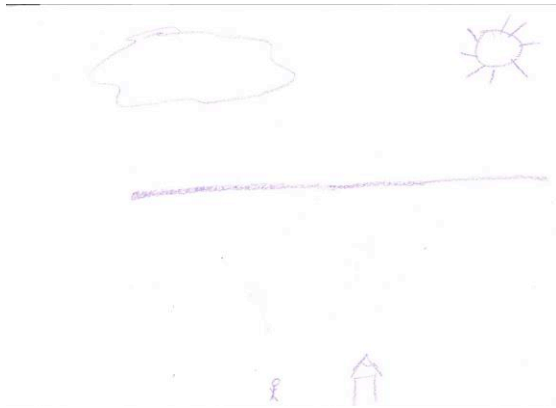
hot air
balloon

(Turbine engine)
Thing

because of Donne
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