

# Four Dimensional Art

562. METZINGER: *Tea Time*, 1911. Panel, 29 1/4 x 27 1/2". Philadelphia Museum of Art, Arensberg Collection.



Figure 1: Metzinger, *Tea Time*

## Introduction

When learning about the fourth dimension, visualization is an important key to success. However, this key tends to be difficult because we live in a three dimensional world and thus are hotwired to think in three dimensions. Another concern is that the fourth dimension is presented with few applications other than as an explanation of the shape of the universe. This worksheet will strive to present how the fourth dimension is used in art and to expand one's visualization of the fourth dimension.

## The Fourth Dimension's Affect on Art

*"Beyond the three dimensions of Euclid we have added another, the fourth dimension, which is to say the figuration of space, the measure of infinite." --Albert Gleizes*

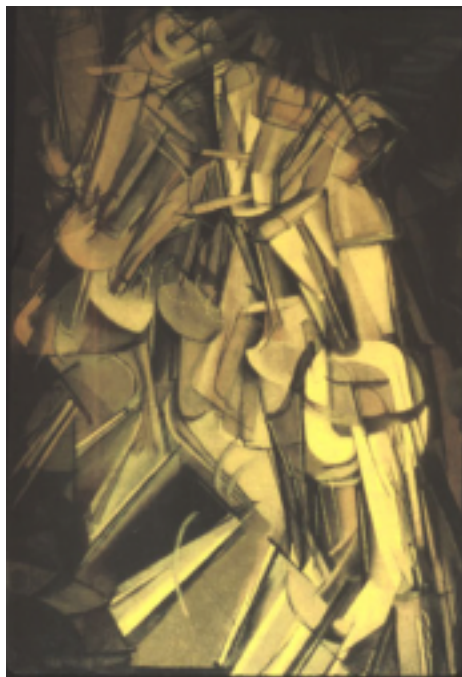
The above quote by the Cubist painter and theorist Albert Gleizes illustrates the profound affect that the concept of the fourth dimension had on art. In fact, it is believed

that the fourth dimension, and the ideals that it implies, are the underpinnings of modern art.

The development of n-dimensional geometries in the 19<sup>th</sup> century allowed the fourth dimension to become a very popular concept of the early 20<sup>th</sup> century. However, the fourth dimension meant more than its geometric orientation as a higher spatial dimension. To many people, including artists, the fourth dimension came to represent infinity and the sublime. The fourth dimension also allowed the people to realize that there is existence beyond a person's perception. Thus, the concept of a fourth dimension pushed artists to represent it as well as the ideals it implies in works of art, and this representation can be seen in almost all modern art.

### **History**

The first documented occurrence of the fourth dimension being used in art appeared in 1910 in Paris. At this point, the fourth dimension was thought as time. An example of this art can be seen in Duchamp's *Nude Descending a Staircase*, below. Take



a moment to study this picture and analyze how the fourth dimension is depicted here. At first the picture may look confusing, but the title clues us into the fact that it should be a person walking down stairs. With this in mind, look at the picture again. Time is depicted as the fourth dimension because the painting pictures different stages of the person's descent.

After the popularization of Einstein's theory of relativity, the fourth dimension started to be used in art differently. Cubists used the fourth dimension as a reason to abandon three-dimensional techniques such as projective painting. Cubists also sought to depict objects, as they would appear in four dimensions. Braque's *Houses Near l'Estaque*, pictured right, is an example of such work.

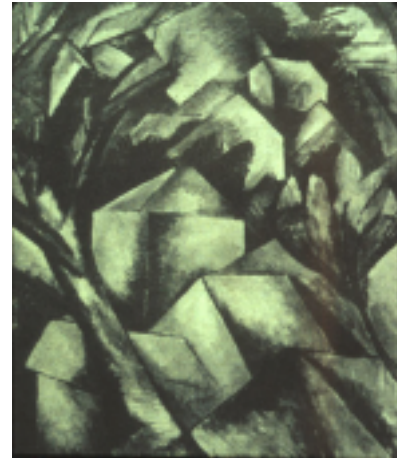
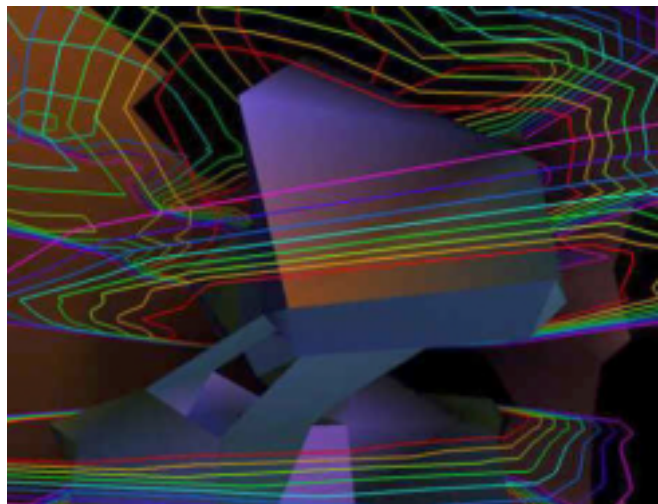


Figure 3: Braque's *Houses Near l'Estaque*

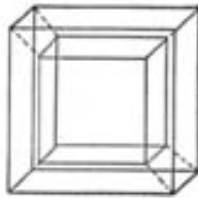
The reach of the fourth dimension stretches into modern art and can be seen in the works of contemporary artists. The following are all works by Novak that depicts objects in four-dimensional space. Take time to study them and understand why they are four-dimensional.



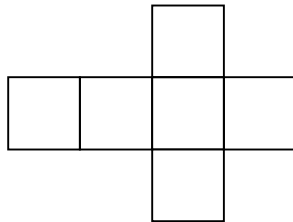
## Dissection of a Piece

To better understand four dimensions and its place in art we are going to dissect Dali's *Corpus Hypercubicus*. To begin we must understand the concept of a hypercube.

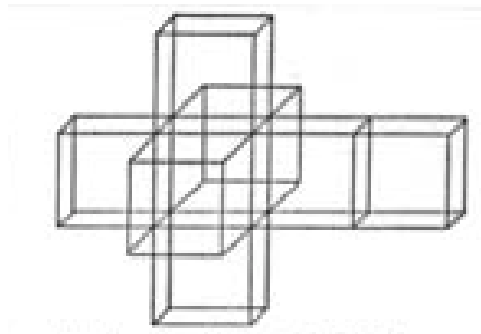
A **hypercube** is, simply, a four dimensional cube. A two-dimensional representation of a hypercube is pictured below. Like a cube, it can be "unfolded" and represented on paper.



**Step 1:** Label the edges of the **unfolded** three-dimensional cube below how you would glue it to make a cube.

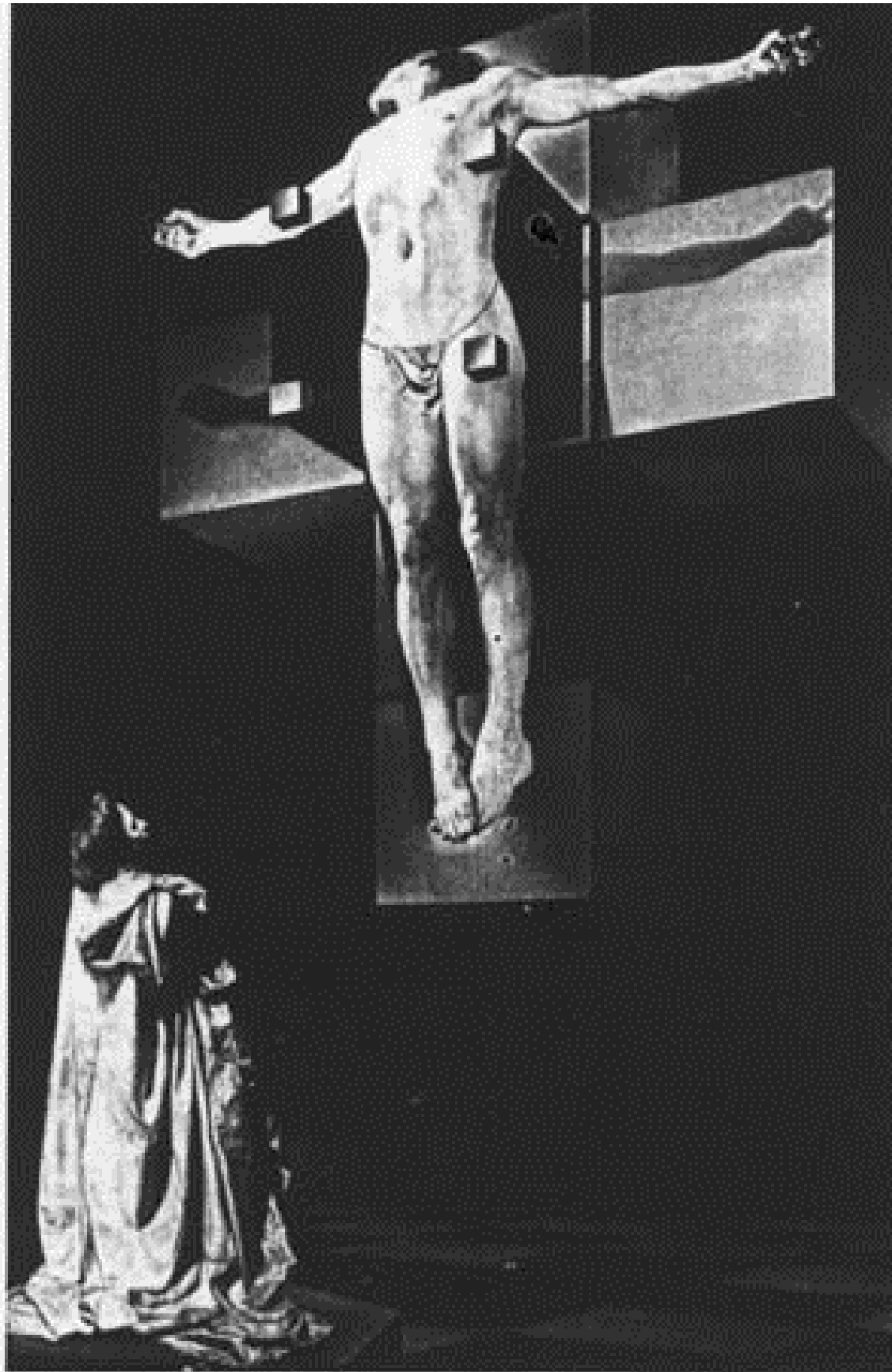


**Step2:** Compare your drawing to the figure below. Do you understand that this can be folded up to form a hyper cube similar to how your drawing can form a regular cube?





**Step 3:** Find and shade the hypercube in Dali's painting below.



**Step 4:** Answer the following questions.

1. Other than the hypercube, are there any other objects that depict the fourth dimension in Dali's *Corpus Hypercubicus*? Why or why not?
2. How many squares are needed to fold up a three-dimensional cube? How many cubes are needed to fold up a four-dimensional hypercube? Can you guess how many will be needed to fold up a five-dimensional cube?
3. Take a look at figure 1. What aspects of the painting clue you in to the fact that the painter considered time as the fourth dimension?

## References

Calter, Paul. (1998) *Geometry in Art and Architecture*. [On-line]. Available at <http://www.dartmouth.edu/~matc/math5.geometry/unit16/unit16.html>

This site was used to find most of the pictures on the worksheet as well and information on how the fourth dimension affected art.

Henderson, Linda. *Fourth Dimension*. [On-line]. Available at <http://english.ttu.edu/courses/5343/fourth.htm>

This summary is great insight into the influence of the fourth dimension in modern art

Wheeler, Craig. (2002) *Astronomy Bizarre: The Fourth Dimension Is Back*. [On-line]. Available at [http://www.space.com/scienceastronomy/generalscience/astrobizarre\\_fourD\\_010619.html](http://www.space.com/scienceastronomy/generalscience/astrobizarre_fourD_010619.html)

This article speaks of the resurgence of the fourth dimension in modern art.

Norvak, Marcos. *Marcos Norvak*. [On-line]. Available at [http://www.uol.com.br/artecidade/novak\\_st.htm](http://www.uol.com.br/artecidade/novak_st.htm)

This website was used to get examples of four-dimensional modern art.



## **Goals**

- **To develop visualization skills of higher dimensions**
- **To show an application of the fourth dimension**
- **To highlight the connection between art and math**