

Measurement & Modeling: Snoopy and the Red Baron

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Much of this eBook first appeared in *Learning & Leading with Technology*, October 2000 (volume 28, number 2) in the article “Starship Gaia: Measurement & Modeling” by Bob Albrecht and Paul Davis.

This eBook is intended for teachers, tutors, and others who help learners learn math and science. We think that measurement and modeling is:

- a big chunk of the foundation of math and science
- a great way to teach math and science
- a terrific tool for integrating math and science

We once lived in Sonoma County, CA, home of Charles Schulz, creator of *PEANUTS* and its characters Charlie Brown, Snoopy, Lucy, Linus, Peppermint Patty, Schroeder, et al. Our favorite comics for 50 years of inspiration and entertainment. Charles Schulz died in the year 2000. Thank you, Charles Schulz. We miss you. Alas, we will never know if Snoopy will someday defeat the Red Baron. Aha! We can relive their encounters in the *PEANUTS* archive:

- Charles M. Schulz Museum <https://schulzmuseum.org/>
- Charles M. Schulz Museum – Snoopy and the Red Baron <https://schulzmuseum.org/traveling-exhibits/snoopy-red-baron/>

About Bob & George. Bob is an 88-year-old human (as of February 2018). George is a dragon. We write math & science eBooks and post them for free download and use as PDF files and Word files at

http://i-a-e.org/downloads/cat_view/86-free-ebooks-by-bob-albrecht.html

Read about Bob & George at http://iae-pedia.org/Robert_Albrecht



DragonFun image by Marcie Hawthorne <http://marciehawthorne.com/>

Simulate the heroic duels of Snoopy and the Red Baron by using scale models of their flying machines. Perhaps you recall that the Red Baron flew a Fokker Dr. I triplane and Snoopy piloted a Sopwith Camel cleverly disguised as a doghouse.



Red Baron's Fokker Dr. 1 image from https://en.wikipedia.org/wiki/Fokker_Dr.I



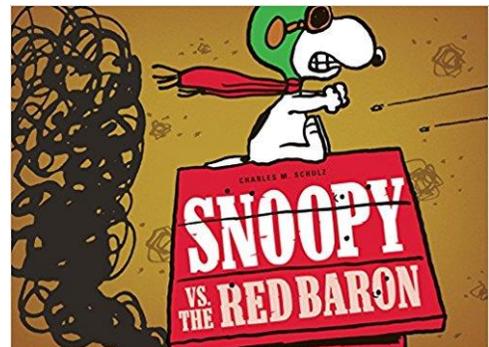
Snoopy's Sopwith Camel image from https://en.wikipedia.org/wiki/Sopwith_Camel

We searched the Internet for pictures of Snoopy flying a Sopwith Camel disguised as his doghouse and found the great image over yonder → at Amazon. It is a picture of the cover of a book. Bob bought a copy for his 9-year-old granddaughter.

Go to Amazon (www.amazon.com), select books, and search for *Snoopy vs. the Red Baron*.

At Amazon, also select books and search for

- *Snoopy and His Sopwith Camel*
- *Snoopy Contact*
- *Snoopy Takes Off*



Here there be links to Internet sites about Snoopy and the Red Baron (2018-01-01):

- My Dad's Albums <https://mydadsalbums.wordpress.com/2014/11/19/snoopy-vs-the-red-baron/>
- Explore Snoopy, ... <https://www.pinterest.com/pin/571675746419175854/>
- Polygon Pete <http://polygonpete.blogspot.com/2007/08/snoopy-vs-red-baron.html>

For many more, crank up your search engine and search for 'Snoopy and the Red Baron'!

Table 1 displays data about Snoopy’s Sopwith Camel and Red Baron’s Fokker Dr. I. Sorry, we were unable to find similar data for Snoopy’s doghouse.

Table 1 Data for Snoopy’s Sopwith Camel and Red Baron’s Fokker Dr. 1 Sopwith Camel https://en.wikipedia.org/wiki/Sopwith_Camel Fokker Dr.I https://en.wikipedia.org/wiki/Fokker_Dr.I		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (meters)	8.53 m	7.19 m
Length (meters)	5.72 m	5.77 m
Height (meters)	2.59 m	2.95 m
Empty mass (kilograms)	420 kg	406 kg
Loaded mass (kilograms)	659 kg	586 kg
Maximum speed (kilometers/hour)	182 km/h	185 km/h
Maximum speed (meters/second)	50.6 m/s	51.4 m/s
Range (kilometers)	485 km	300 km
Ceiling (meters)	5791 m	6100 m
Rate of climb (meters/second)	5.5 m/s	5.7 m/s

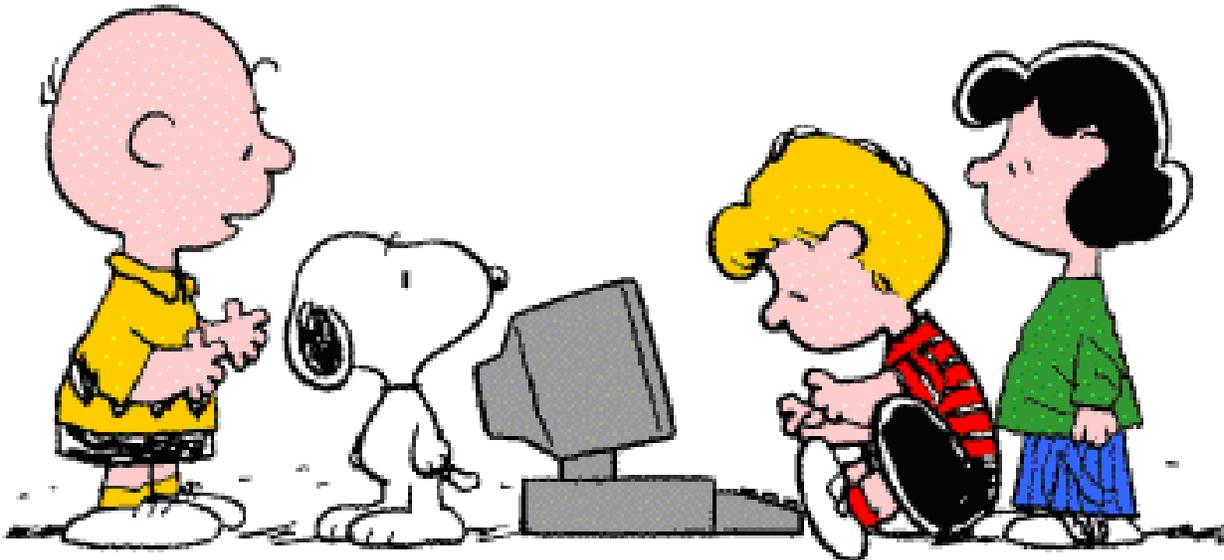
We flew a reconnaissance mission into the Internet looking for scale models of the Sopwith Camel and Fokker Dr. 1. At Amazon, we found models of both airplanes in scales such as 1/72, 1/48, 1/24, and 1/16. A 1/72 scale model is smaller than and less expensive than 1/48, 1/24, and 1/16 scale models. We frugally opted for 1/72 scale models: every model measure is 1/72 that measure of the object being modelled. Table 2 displays 1/72 scale model values of data selected from Table 1 up yonder ↑.

Table 2 Data for 1/72 scale models of Snoopy’s Sopwith Camel and Red Baron’s Fokker Dr. 1		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (meters)	$8.53 \text{ m} / 72 = 0.118 \text{ m}$	$7.19 \text{ m} / 72 = 0.100 \text{ m}$
Length (meters)	$5.72 \text{ m} / 72 = 0.0794 \text{ m}$	$5.77 \text{ m} / 72 = 0.0801 \text{ m}$
Height (meters)	$2.59 \text{ m} / 72 = 0.0360 \text{ m}$	$2.95 \text{ m} / 72 = 0.0410 \text{ m}$
Maximum speed (kilometers/hour)	$182 \text{ km/h} / 72 = 2.53 \text{ km/h}$	$185 \text{ km/h} / 72 = 2.57 \text{ km/h}$
Maximum speed (meters/second)	$50.6 \text{ m/s} / 72 = 0.703 \text{ m/s}$	$51.4 \text{ m/s} / 72 = 0.714 \text{ m/s}$
Range (kilometers)	$485 \text{ km} / 72 = 6.74 \text{ km}$	$300 \text{ km} / 72 = 4.17 \text{ km}$
Ceiling (meters)	$5791 \text{ m} / 72 = 80.43 \text{ m}$	$6100 \text{ m} / 72 = 84.72 \text{ m}$
Rate of climb (meters/second)	$5.5 \text{ m/s} / 72 = 0.076 \text{ m/s}$	$5.7 \text{ m/s} / 72 = 0.079 \text{ m/s}$
At www.Amazon.com search for <ul style="list-style-type: none"> Sopwith Camel 1/72 Fokker Dr. 1 1/72 We found the 1/72 models pictured over yonder →. Cost: less than \$15 on 2018-01-19. Beware: They are kits and require assembly.	 <p>Sopwith Camel 1/72 scale model at www.Amazon.com</p>	 <p>Fokker Dr. 1 1/72 scale model at www.Amazon.com</p>

Table 3 displays data from Table 2 in units appropriate (we think) for playing with the scale models.

Table 3 Data for 1/72 scale models of Snoopy's Sopwith Camel and Red Baron's Fokker Dr. 1		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (m & cm)	0.118 m = 11.8 cm	0.110 m = 10.0 cm
Length (m & cm)	0.0794 m = 7.9 cm	0.0801 m = 8.0 cm
Height (m & cm)	0.0360 m = 3.6 cm	0.0410 m = 4.1 cm
Maximum speed (m/s & cm/s)	0.703 m/s = 70.3 cm/s	0.714 m/s = 71.4 cm/s
Range (km)	6.74 km = 6740 m	4.17 km = 4170 m
Ceiling (meters)	80.43 m	84.72 m
Rate of climb (m/s & cm/s)	0.076 m/s = 7.6 cm/s	0.079 m/s = 7.9 cm/s

We wonder: How tall is Snoopy in 1/72 scale? That begs the question, how tall is Snoopy? We searched the Internet, but did not find the answer. However, we found a great picture of the *PEANUTS* gang with Snoopy standing next to Charlie Brown.



This picture was printed with permission from United Feature Syndicate, Inc. in "Measurement & Modeling" by Bob Albrecht & Paul Davis in *Learning & Leading with Technology*, October 2000, Volume 28, Number 2.

Aha! If we knew Charlie Brown's height, we could measure his height and Snoopy's height in the picture and then use a ratio to calculate Snoopy's height. We didn't find Charlie Brown's height but learned that he is probably 8 years old. More Internet snooping revealed that the average height of an 8-year-old boy is about 128 centimeters. We'll go with that height for Charlie Brown. On a printed copy of the picture, Charlie Brown stands 7.2 centimeters tall, and Snoopy is 4.0 centimeters tall. The ratio of Snoopy's height to Charlie Brown's height expressed as a fraction is $4.0 \text{ cm} / 7.2 \text{ cm} = 5/9$. Assume that Charlie Brown's height is 128 cm and calculate Snoopy's height and 1/72 scale height.

- Snoopy's height = $5/9$ of Charlie Brown's height = $(5/9) (128 \text{ cm}) = 71 \text{ cm}$
- Snoopy's 1/72 scale height = $(1/72) (71 \text{ cm}) = 0.99 \text{ cm}$ [approximately 1 cm]

Help! Where do we find a 1-cm tall scale model of Snoopy? If you find one or make one, please share!

Your Turn Table 4 displays data for Snoopy’s Sopwith Camel and Red Baron’s Fokker DR. 1. Your task: Complete Table 5 showing data for a 1/48 scale model of the two airplanes and Table 6 showing the data in ‘appropriate’ units for playing with the scale models.

Table 4 Data for Snoopy’s Sopwith Camel and Red Baron’s Fokker Dr. 1		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (meters)	8.53 m	7.19 m
Length (meters)	5.72 m	5.77 m
Height (meter)	2.59 m	2.95 m
Maximum speed (meters/second)	50.6 m/s	51.4 m/s
Range (kilometers)	485 km	300 km
Ceiling (meters)	5791 m	6100 m
Rate of climb (meters/second)	5.5 m/s	5.7 m/s

Table 5 Data for 1/48 scale models of Snoopy’s Sopwith Camel and Red Baron’s Fokker Dr. 1		
Your task: Calculate data for 1/48 scale models.		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (meters)	8.53 m / 48 = _____	7.19 m / 48 = _____
Length (meters)	5.72 m / 48 = _____	5.77 m / 48 = _____
Height (meters)	2.59 m / 48 = _____	2.95 m / 48 = _____
Maximum speed (meters/second)	50.6 m/s / 48 = _____	51.4 m/s / 48 = _____
Range (kilometers)	485 km / 48 = _____	300 km / 48 = _____
Service ceiling (meters)	5791 m / 48 = _____	6100 m / 48 = _____
Rate of climb (meters/second)	5.5 m/s / 48 = _____	5.7 m/s / 48 = _____

Table 6 Data for 1/48 scale models of Snoopy’s Sopwith Camel and Red Baron’s Fokker Dr. 1		
Your task: Calculate 1/48 scale data in ‘appropriate’ units for playing with scale models (see Table 3).		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (m & cm)	_____ m = _____ cm	_____ m = _____ cm
Length (m & cm)	_____ m = _____ cm	_____ m = _____ cm
Height (m & cm)	_____ m = _____ cm	_____ m = _____ cm
Maximum speed (m/s & cm/s)	_____ m/s = _____ cm/s	_____ m/s = _____ cm/s
Range (km & m)	_____ km = _____ m	_____ km = _____ m
Ceiling (m)	_____ m	_____ m
Rate of climb (m/s & cm/s)	_____ m/s = _____ cm/s	_____ m/s = _____ cm/s

Answers

Table 5 Data for 1/48 scale models of Snoopy's Sopwith Camel and Red Baron's Fokker Dr. I Your task: Calculate data for 1/48 scale models.		
Datum	Sopwith Camel	Fokker Dr. I
Wingspan (meters)	$8.53 \text{ m} / 48 = 0.178 \text{ m}$	$7.19 \text{ m} / 48 = 0.150 \text{ m}$
Length (meters)	$5.72 \text{ m} / 48 = 0.119 \text{ m}$	$5.77 \text{ m} / 48 = 0.120 \text{ m}$
Height (meters)	$2.59 \text{ m} / 48 = 0.0540 \text{ m}$	$2.95 \text{ m} / 48 = 0.0615 \text{ m}$
Maximum speed (meters/second)	$50.6 \text{ m/s} / 48 = 1.05 \text{ m/s}$	$51.4 \text{ m/s} / 48 = 1.07 \text{ m/s}$
Range (kilometers)	$485 \text{ km} / 48 = 10.1 \text{ km}$	$300 \text{ km} / 48 = 6.25 \text{ km}$
Ceiling (meters)	$5791 \text{ m} / 48 = 120.6 \text{ m}$	$6100 \text{ m} / 48 = 127.1 \text{ m}$
Rate of climb (meters/second)	$5.5 \text{ m/s} / 48 = 0.11 \text{ m/s}$	$5.7 \text{ m/s} / 48 = 0.12 \text{ m/s}$

Table 6 Data for 1/48 scale models of Snoopy's Sopwith Camel and Red Baron's Fokker Dr. 1 Your task: Calculate 1/48 scale data in units 'appropriate' for playing with scale models (see Table 3).		
Datum	Sopwith Camel	Fokker Dr. 1
Wingspan (m & cm)	$0.178 \text{ m} = 17.8 \text{ cm}$	$0.150 \text{ m} = 15.0 \text{ cm}$
Length (m & cm)	$0.119 \text{ m} = 11.9 \text{ cm}$	$0.120 \text{ m} = 12.0 \text{ cm}$
Height (m & cm)	$0.0540 \text{ m} = 5.4 \text{ cm}$	$0.0615 \text{ m} = 6.2 \text{ cm}$
Maximum speed (m/s & cm/s)	$1.05 \text{ m/s} = 105 \text{ cm/s}$	$1.07 \text{ m/s} = 107 \text{ cm/s}$
Range (km & m)	$10.1 \text{ km} = 10,100 \text{ m}$	$6.25 \text{ km} = 6,250 \text{ m}$
Ceiling (m)	120.6 m	127.1 m
Rate of climb (m/s & cm/s)	$0.11 \text{ m/s} = 11 \text{ cm/s}$	$0.12 \text{ m/s} = 12 \text{ cm/s}$
Pictures of 1/48 scale models are from www.Amazon.com Go to Amazon and search for <ul style="list-style-type: none"> • Sopwith Camel 1/48 • Fokker Dr. 1 1/48 Up, up, and away!		

Your Turn Here are suggestions for Snoopy and the Red Baron activities, investigations and projects.

1. Go to the Internet and check out the data in **Table 1 Data for Snoopy's Sopwith Camel and Red Baron's Fokker Dr. 1**. Did we make errors or omissions? If yes, please correct them.
2. Check out our calculations in **Table 2 Data for 1/72 scale models of Snoopy's Sopwith Camel and Red Baron's Fokker Dr. 1**. If we made mistakes, please fix them.
3. Check out our calculations in **Table 3 Data for 1/72 scale models of Snoopy's Sopwith Camel and Red Baron's Fokker Dr. 1**. If we erred, please rectify our miscalculations.
4. Check out our assumptions about Charlie Brown's age and height and Snoopy's height. Is Charlie Brown 8 years old and 128 centimeters tall? Is Snoopy's height $\frac{5}{9}$ of Charlie's height (71 cm)?
5. Check out Charlie Brown's and Snoopy's 1/72 scale heights. What is Charlie Brown's 1/72 scale height? Is Snoopy's 1/72 scale height about 1 cm?
6. Check out our data in **Table 4 Data for Snoopy's Sopwith Camel and Red Baron's Fokker Dr. 1**. Is it right on or did we bungle? If we bungled, please make it right.
7. When Bob was a kid Charlie Brown's age, he 'flew' model airplanes while making appropriate airplane sounds. Suppose you 'fly' a Sopwith Camel 1/72 scale model at an altitude of 1 meter above your playground. What is the corresponding altitude of the full-size airplane?
8. The maximum speed of a Sopwith Camel is 50.6 m/s. The corresponding 1/72 scale model maximum speed is 70.3 cm/s. How long will it take to 'fly' a 1/72 scale model Sopwith Camel 100 meters at maximum speed? How long to travel 1 kilometer?
9. Airplanes do not travel at maximum speed all the time – uses much fuel and wears out the engine. To get from here to there, an airplane usually travels at 'cruising speed' which is less than maximum speed. We did not find Sopwith Camel's cruising speed at a site we trusted. We think that cruising speed is approximately 90% of maximum speed. What is Sopwith Camel's cruising speed? What is its 1/72 scale model cruising speed?
10. Fly a 1/72 scale model Sopwith Camel at cruising speed. How long will it take to travel 100 meters? How long to travel 1 kilometer?
11. The maximum speed of a Fokker Dr. 1 is 51.4 m/s. The corresponding 1/72 scale model maximum speed is approximately 71.4 cm/s. How long will it take to 'fly' a 1/72 Fokker Dr. 1 scale model 100 meters at maximum speed? How long to travel 1 kilometer?
12. We did not find Fokker Dr. 1's cruising speed at a site we trusted. Assume that its cruising speed is approximately 90% of its maximum speed. What is Fokker Dr. 1's 1/72 model cruising speed?
13. Fly a 1/72 scale model Fokker Dr. 1 at cruising speed. How long will it take to travel 100 meters? How long to travel 1 kilometer?

Answers to Questions 7 through 13

7. We 'flew' a Sopwith Camel 1/72 scale model at an altitude of 1 meter above our playground. The corresponding altitude of the full-size airplane is 72 meters.
8. The maximum speed of a Sopwith Camel is 50.6 m/s. The corresponding 1/72 scale model maximum speed is 70.3 cm/s. How long will it take to 'fly' a 1/72 scale model Sopwith Camel 100 meters at maximum speed? How long to travel 1 kilometer?
 $100 \text{ m} = 10,000 \text{ cm}$. $(10,000 \text{ cm}) / (70.3 \text{ cm/s}) = 142 \text{ s}$ [2.37 minutes]
 $1 \text{ km} = 1000 \text{ m} = 100,000 \text{ cm}$. $(100,000 \text{ cm}) / (70.3 \text{ cm/s}) = 1,420 \text{ s}$ [23.7 minutes]
9. Assume that cruising speed is about 90% of maximum speed. If true, what is Sopwith Camel's 1/72 scale model's cruising speed? $90\% \text{ of } 70.3 \text{ cm/s} = (0.90) (70.3 \text{ cm/s}) = 63.3 \text{ cm/s}$.
10. Fly a 1/72 scale model Sopwith Camel at cruising speed. How long will it take to travel 100 meters? How long to travel 1 kilometer?
 $100 \text{ m} = 10,000 \text{ cm}$. $(10,000 \text{ cm}) / (63.3 \text{ cm/s}) = 158 \text{ s}$ [2.63 minutes]
 $1 \text{ km} = 1000 \text{ m} = 100,000 \text{ cm}$. $(100,000 \text{ cm}) / (63.3 \text{ cm/s}) = 1580 \text{ s}$ [26.3 minutes]
11. The maximum speed of a Fokker Dr. 1 is 51.4 m/s. The corresponding 1/72 scale model maximum speed is 71.4 cm/s. How long will it take to 'fly' a 1/72 scale model Fokker Dr. 1 100 meters at maximum speed? How long to travel 1 kilometer?
 $100 \text{ m} = 10,000 \text{ cm}$. $(10,000 \text{ cm}) / (71.4 \text{ cm/s}) = 140 \text{ s}$ [2.33 minutes]
 $1 \text{ km} = 1000 \text{ m} = 100,000 \text{ cm}$. $(100,000 \text{ cm}) / (71.4 \text{ cm/s}) = 1400 \text{ s}$ [23.3 minutes]
12. Assume that a Fokker Dr. 1's cruising speed is about 90% of its maximum speed. If true, what is Fokker Dr. 1's 1/72 model cruising speed? $(0.90) (71.4 \text{ cm/s}) = 64.3 \text{ cm/s}$.
13. Fly a 1/72 scale model Fokker Dr. 1 at cruising speed. How long will it take to travel 100 meters? How long to travel 1 kilometer?
 $100 \text{ m} = 10,000 \text{ cm}$. $(10,000 \text{ cm}) / (64.3 \text{ cm/s}) = 156 \text{ s}$ [2.60 minutes]
 $1 \text{ km} = 1000 \text{ m} = 100,000 \text{ cm}$. $(100,000 \text{ cm}) / (64.3 \text{ cm/s}) = 1560 \text{ s}$ [26.0 minutes]

Your Turn without **Answers**:

- Redo questions 7 through 13 for 1/48 scale models.
- Create **your** *PEANUTS* activities and adventures. For inspiration and entertainment, go to
 - Charles M. Schulz Museum <https://schulzmuseum.org/>
 - Charles M. Schulz Museum – Snoopy and the Red Baron <https://schulzmuseum.org/traveling-exhibits/snoopy-red-baron/>
- Find books about Charles Schulz and *PEANUTS* memorabilia at www.Amazon.com .
 - Search for 'Charles Schulz'.
 - Search for 'PEANUTS'.
 - Search for 'United Feature Syndicate'.

Nostalgia: Charlie Brown & Snoopy at Depot Park in Santa Rosa

Once we lived in Santa Rosa, CA close to Santa Rosa Creek one kilometer from Railroad Square.

- Railroad Square <https://www.tripsavvy.com/santa-rosa-railroad-square-walking-tour-2940946>

Most mornings we walked to Flying Goat Coffee or A’Roma Roasters Coffee in Railroad Square. After drinking coffee and working a crossword puzzle, we wandered over to Depot Park to say hello to Charlie Brown and Snoopy manifested in the form of a bronze statue.

- Depot Park <https://foursquare.com/v/depot-park/5172e011498e0949bfc6327>

After enjoying our sojourn to Depot Park, we usually walked a few kilometers along Santa Rosa Creek, then went home and cranked up our eBook writing machine. Aah, those were happy days!

Elsewhere in Santa Rosa there be statues of *PEANUTS* characters.

- PEANUTS statues – Santa Rosa, CA <https://www.roadsideamerica.com/story/24523>
- Santa Rosa Peanuts Statues <https://www.pinterest.com/pin/341429215478701238/>

2018-01-23. We arrive at the end of our Snoopy and the Red Baron reminiscences and eBook. Thank you, Charles Schulz and the *PEANUTS* gang for 50 years of inspiration and entertainment.

Reality expands to fill the available fantasies. – Bob & George



DragonFun image by Marcie Hawthorne <http://marciehawthorne.com/>