



# せの高さまで紙パッチンをとばそう

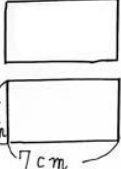
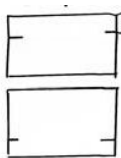

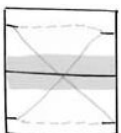
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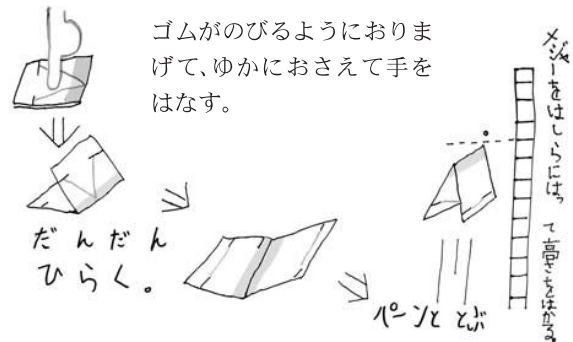
## けんきゅうのきっかけ

紙パッチンは30cmくらいとぶおもちゃで、よくつくり  
ます。でも、もっととぶのをつくれなかなと思ひ、この  
けんきゅうにしました。もくひょうは自分のせの高さ126  
cmです。

## 紙パッチンのつくりかた

- ①  牛にゆうパックを4×7cmの大き  
さに2まい切る。
- ②  はじから1cmのところにはサミで切  
りこみを入れる。
- ③  ガムテープをうらおもてにはって牛  
にゆうパックをつなげる。
- ④  切りこみにゴムをかけてかんせい。

## 紙パッチンのとばしかた



## さくせん1 そのつど考えてかいらょうしていく

1ごうから8ごうまでつくったが、ここではおもなも  
のだけをせつめいする。それぞれ5回とばして1ばんと  
んだ高さをきろくとした。



ゴム1つ  
32 (34) 32 30 31 (cm)

ゴムを2つにしたらもっとと思ったが、紙がよわくて  
まがってしまいとばなかった。



ゴム1つ  
26 (30) 30 28 30 (cm)  
ゴム2つ  
(40) × × × × (cm)

じょうぶなダンボールでつくった。ゴムを2つにして

40cmとんだが、から回りがおきた(×であらわす)。

※から回りとは

紙のもどるいきおいがつきすぎて紙がゆかをおす前にはねてしまい、ぜんぜんとばない。



ゴム1つ	70 78 (80) 70 80 (cm)
ゴム2つ	90 100 97 103 (104) (cm)
ゴム3つ	紙がおれた

ゴムがのびるようにたての長さを7cmにした。104cmもとんだ。



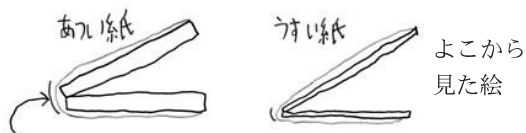
ゴム2つ	115 111 115 (131) 125 (cm)
ゴム3つ	145 124 × (150) 140 (cm)
ゴム4つ	× × × × ×

ゴムがもっとのびるようにたての長さを11cmにした。よこはかるくなるように5cmとみじかくした。なんと150cmもとんだ。もくひょうをたっせいした。

★考えたこと★

●から回りについて

うすい紙をつかったほうが、から回りはおきにくいのかもしれない。牛にゆうバックでつくったものはダンボールよりもずっとゆっくりひらいたのでそう思った。



このぶぶんが長いと紙がもどるのが早くなり、から回りがおきるのかもしれない。

●形について

たてに長いほうがよこに長いよりもよくとぶと思った。たて長のほうがゴムをたくさんおさえるからだと思う。

●大きさについて

大きいとゴムをたくさんおさえるけれど、おもくなるし、おれやすくなるので、とぶかどうかかわからない。

小さいとゴムはあまりのびないけれどかるくなるのでとぶかもしれない。紙のしゅるいによってちょうどいい大きさがあるのかもしれない。

●つぎのさくせんについて

うすくてじょうぶでかるい紙でいろいろな大きさとためせばもっとよくとぶものがみつかるのかもしれない。

さくせん2 紙のしゅるい、大きさ、ゴムの数をかえてしらべる

うすくてじょうぶでかるい紙を3つえらんだ。

	中と小をあわ
Aおかしのはこ	あつさ せたおもさ 1.39cm 16g
Bおかしのはこ	1.53cm 8g
Cすいとうのはこ	1.98cm 9g
(8ごうのダンボール)	(2.96cm)

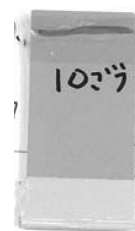
大きさは大(12×6cm)、中(10×5cm)、小(7×3.5cm)の3しゅるいでためした。はじめは大を、15×7.5cmにしたがゴムが切れてしまった。

A-大



ゴム1	42 52 (53) 51 45 (cm)
ゴム2	62 (96) 97 60 69 (cm)
ゴム3	× (130) 122 × 93 (cm)

A-中



ゴム1	50 50 53 54 (60) (cm)
ゴム2	93 (98) 83 87 96 (cm)
ゴム3	72 (77) 64 76 70 (cm)

A-小



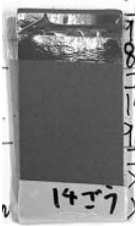
ゴム1	40 42 42 (43) 41 (cm)
ゴム2	(80) 81 52 76 37 (cm)
ゴム3	× × × × ×

B-大



ゴム1	90	84	80	77	80	(cm)
ゴム2	64	104	×	90	×	(cm)
ゴム3	×	×	×	紙がおれた	×	(cm)

B-中



ゴム1	93	95	85	84	82	(cm)
ゴム2	114	123	103	98	98	(cm)
ゴム3	×	70	×	×	×	(cm)

B-小



ゴム1	40	50	40	49	41	(cm)
ゴム2	×	32	×	53	×	(cm)
ゴム3	×	×	×	×	×	(cm)

C-大



ゴム1	81	101	105	95	96	(cm)
ゴム2	120	111	103	135	133	(cm)
ゴム3	142	123	155	160	155	(cm)

C-中



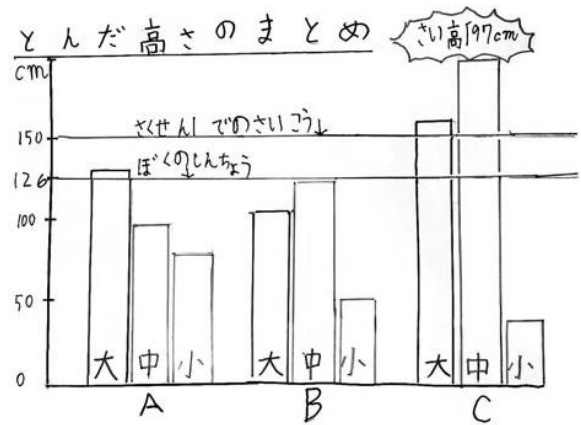
ゴム1	92	77	89	84	96	(cm)
ゴム2	120	125	137	123	123	(cm)
ゴム3	150	139	87	197	188	(cm)

C-小



ゴム1	42	35	40	41	40	(cm)
ゴム2	×	×	×	×	×	(cm)

★とんだ高さのまとめ



Cの中が1ばん高くとんだ。小はA B Cのどれもから回りがおきやすく、とばなかった。

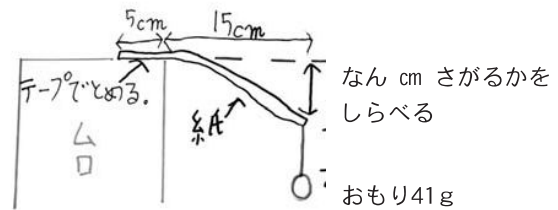
★Cの中のとぶときのようす



このときも、180cm ぐらいとんだ。

なぜCの紙が1ばんとんだのか

BはCよりもうすしかかったのにCはから回りもしにくくよくとんだ。そこでじゃうぶさをしらべた。



紙の大きさは2 × 20cm。

さがった長さは、A 5 cm、B 9 cm、C 3 cmだった。Cは1ばんじゃうぶだったことがわかった。

## かんそう

197cmもとぶものができてびっくりした。から回りがおきずによくとばすためには、紙がうすいことだけでなく、大きさやじょうぶさもたいせつだとわかりました。

なぜそうなのかは、またけんきゅうでしらべたいと思います。



## 講 評

### 背の高さまで紙パッチンをとばそう

単な紙パッチンにのおもちゃに着目して、飛ばして楽しむだけではなくより高く飛ばすためにはどうしたらよいかと紙の厚さや大きさ、ゴムの強さ(回数)に工夫をこらして、データを複数(それぞれ5回)とり平均化して客観的に考察していることは、科学的な見方・考え方をしっかりと押さえておりとてもすばらしい。

実験方法を「さくせん」という名称にしたり、「から回りとは」と解説をつけていることは研究の独創性を感じる。さらには、紙パッチンを飛ばす目標を自分自身の身長に設定していることで実験を意欲的に楽しく取り組んでいるようすがよく伝わります。

また、「から回り」を防ぐ方法を根拠をもって紙の厚さや長さ、さらには紙の重さまで考察し、検証していることで研究内容が深まっている。「さくせん2」においては、8号段ボールの強度を実験でしっかりと検証しているところも評価に値する。

この研究は柔軟な発想で多角的な視点で取り組んで行くことと、実験のデータを数多くとることで客観性を帯び、さらに研究に厚みが出てき期待が持てます。



## 沖縄県知事賞

### What Approach Maximizes Task Completion:

A Comparative Study with ADHD and Non ADHD Students 2008-2010

どのような学習法が課題の達成に一番良いのか：

ADHDと非ADHDの生徒に関する比較研究 2008-2010

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#### Introduction Problem and Hypotheses

For my science project I selected a medical/behavioral issue that is very important to me. All my school life I have run into problems at school remembering to do assignments, staying on task, writing papers, and doing a lot of steps at one time. I have ADHD. There always seems to be conflict with doing homework because it takes so long and I don't always remember what was said in class. My teachers, especially at the beginning of the year, don't always understand my needs, and expect me to do things like everyone else. I don't think or act like most other students. But I can do the work, if it is presented in the right way for me. The problem for this study is finding ways for teachers to help ADHD students learn better, using the same tasks as every other student would have to do. If ADHD students have a hard time remembering directions and facts when they are presented, what strategies can be used? Would these strategies be good for all students?

#### Hypotheses

Hypothesis 1:

Given a set of tasks to complete, students who do not have an ADHD diagnosis will complete the tasks with a higher score than ADHD students when asked to do the tasks with only auditory instructions.

Hypothesis 2:

Given a set of tasks to complete, students with ADHD and non-ADHD students will both complete the tasks with a higher score when multiple approaches to the tasks are allowed.

#### Introduction and Problem

I see other students like me. Sometimes they don't get the help that I do because their parents might not know what to do or what to ask for at school. Sometimes teachers don't see the need to modify assignments, even though it's important for us to succeed. However, some teachers really do understand and try different ways of teaching and supporting students with ADHD. Sometimes my teachers don't know what kind of modifications to make. They think that I can do all the writing as long as I have more time, but it would be better to shorten the writing so I could think better. I can't listen, and do two things at once involving words, but I can draw while I listen. I can draw my notes.

Some research has been done on how children with ADHD learn better at school with accommodations (Nielson, 2000). For instance, I know that when there is an active part of the lesson, combined with writing or talking, ADHD students do better. I know that students with ADHD often have an auditory processing deficiency (Rothenberger, 2005; Greathead, 2008) and that means when a teacher lectures, it goes in one ear and out the other. This also happens with students who don't have ADHD. When students with ADHD are asked to memorize long sequences, they often get frustrated.

The part of the brain that regulates the memory process is not very well developed in children with ADHD.

The problem I want to solve is to find out what ways students with ADHD learn the best. I already know that doing something active is beneficial to learning, but if you add another component, like looking at a model, will that help even more? I think that if an ADHD student is expected to learn material through lecture only, there won't be much retention. If the ADHD student can draw, or take notes, and ask questions during the lecture, will the retention rate be higher, or will these methods be more of a distraction? If you give an ADHD student a mnemonic to remember material, will it increase their retention rate?

To give a better line of sight of how ADHD students respond to certain methods of teaching, it is important to also measure how students without ADHD respond. This comparison will show if the methods used have any effect on ADHD student learning and if it is the same or different effect than that on non ADHD students.

I hope to show that by using multiple approaches to learning, ADHD students can succeed with their class work and homework, like any other student. The important part of what I hope to accomplish is to show how certain methods work the best. Then, I want to share this with my teachers, and my friends' teachers. I am an "at risk" student. I don't have to be if my teachers understand how I learn best and help me.



## Review of Literature

Causes of ADHD have grounded research to support they are neurobiological and genetic based (McClure 2008). Many people say there is little evidence at this time in history that ADHD can be caused purely from social factors or child-rearing methods. Studies done by Susan Sprich of Massachusetts General Hospital in 2001 show that heredity greatly influences the occurrence of ADHD. These studies indicate that approximately 80 percent of ADHD cases can be traced to genetic factors.

"Because of the significant overlap between ADHD and academic underachievement, one might expect that there has been considerable research into nonmedical interventions to enhance

academic functioning" (McClure, 2008). This is not the case. In 2007, 41 experimental studies were evaluated. These studies looked at the impact of nonmedical interventions on how students functioned academically (McClure, 2008), but that there was so little in the literature about this subject that not many conclusions about intervention effects and generalization could be made. There is a need for research in this area and to find out more.

Brain activity differs in children with ADHD than those who are not ADHD. Both the frontal lobe and the cerebellum are smaller in ADHD brains. This means that ADHD is the result of abnormal information processing which affects emotion and control over impulses and movements. When children with ADHD are asked to do more than one thing at one time using their brains, they may break down. Also, when asked to do tasks requiring speed, thoroughness, or endurance, the performance of students with ADHD decreases dramatically compared with the brains of other children (Rothenberger, 2005).

Children with ADHD have the need to move and are impulsive, which is linked to the brain's executive function of the working memory. In most children, this executive function develops over time. In children with ADHD, it doesn't develop very well at all. Children with ADHD are often in a constant battle with their emotions. Classrooms have been identified as being problematic settings for students with ADHD (Child Development Institute, 2000).

The number one complaint by children with ADHD is "My teacher does not care." (Daly, 2008). Children with ADHD have related auditory processing difficulties such as the speed of processing their thoughts and speech, auditory memory, and processing of auditory information. This means that following directions or having to get or give information from something they have read or listened to, can be a nightmare (Greathead, 2008). Central auditory processing problems can affect a student's learning in reading and spelling.

Children with ADHD often are underachievers. However, underachievers want to be successful, but don't know how. Especially with ADHD children, their ability to remember is impaired; their ability to process information from a lecture is significantly impaired; their ability to self pace and complete an assignment is impaired; and their undesirable behaviors from the hyperactivity

cause problems. That is why it is especially important for educators to recognize the research on ADHD behaviors and take steps to help children with their learning.

Some research based strategies to use with students with ADHD to increase learning output and decrease the negative behaviors connected with ADHD, include (Daly, 2008; Elbert County, 2008):

- Use of mnemonics which is using an acronym to help students remember through recitation, repetition and practice.
- Break down assignments into steps for students to follow
- Teaching note taking strategies to increase the benefits of direct instruction
- Let students set their own pace
- Teachers must be prepared to repeat directions frequently.
- Provide a lecture outline to assist in note taking.
- Decrease the length of assignments or lessons
- Alternate physical and mental activities
- Give choices in academic assignments

It is more difficult for students with ADHD to sit still on some days than others. Teachers need to be flexible and modify instructional demands as needed. It is not a good idea to rely on the student with ADHD to remember rules. It is the responsibility of the teacher to repeat, remind, and encourage.

So why is it important to find out more about what helps students with ADHD succeed in school? “Adolescents with ADHD are more likely than the general student population to be retained, get suspended, or quit school.” (McClure, 2008). Research indicates that much is known about the cause of ADHD but not much research has been accomplished to determine the best interventions to help ADHD children do what they are capable of. A very disturbing finding in the article “Informing the ADHD Debate” is that psychosocial factors, including a non-supportive school environment, can transform a latent tendency into a full-blown ADHD disorder.



## Methods and Materials

I designed three tasks for students to complete. For each of the three tasks, the students were asked to complete it with only written or oral

directions. The second time the students were given the task (not the same exact task, but one comparable in scope and difficulty), they received more instructions, or a model to look at, or were able to take notes. Here are the three tasks that were given to each student to complete:

### Building a Model (Task 1)

I designed a simple model with LEGO bricks (11 bricks). I described how the model was built with written instructions. The written instructions were given to the student with 11 loose LEGO bricks. The student was given 5 minutes to build the model correctly.

### Building a Model (Task 1) Second Time

I designed another simple model with LEGO bricks (11 bricks). I described how the model was built orally. The model was placed on the table in front of the student and the student was asked to pick up the model, observe it at all angles, ask questions, and then build it. The student was given 11 loose LEGO bricks and asked to build the model correctly in 5 minutes.

### Word Memory (Task 2)

I selected 8 vocabulary words that were in the third-to fifth grade range in difficulty. I told the student to listen carefully as I read the 8 words aloud because he/she would be asked to write them down in order. Spelling does not count. These were the words: inside, like, outlet, vegetable, egg, yarn, omelet , unravel

### Word Memory (Task 2) Second Time

I selected 8 vocabulary words that were in the third-to-fifth grade range in difficulty (but different from the first time). The words were written down and I showed the words to the student as I read them aloud. I told the student that after we practiced the words, I would give him/her a mnemonic to help remember the words. The student would be asked to write the eight words down by memory, in order. These were the words: India, lovely, out, video everyday, yes, only, utensil. The mnemonic was I LOVE YOU.

### Story Memory (Task 3)

I selected an excerpt from the book *Chocolate Fever* (Robert Smith). I told the student that I would read the story aloud and then give him/her a set of questions (appendices) to write down the answers to. The object was to get as many answers correct as possible.

### Story Memory (Task 3) Second Time

I selected an excerpt from the book *Who Moved My Cheese?* (Spencer Johnson). I gave the student all the questions they would have to answer at the end of the story. I told the student that he/she could take any notes they wanted while I read the story. At the end of the story he/she could finish answering any questions (appendices) not completed while taking notes. The object was to get as many answers correct as possible.

The reason I selected the tasks the way I did was because I wanted it to be like how we get our instruction in school. For example, some teachers lecture and then give you a pop quiz or a test. I designed the Story Memory task to simulate this. Some teachers ask you to do a three dimensional projects by just reading the literature (in Social Studies). Some math teachers expect you do geometrical problems on paper when you don't know the concept of how the shape was built. I designed the LEGO task to simulate this. Some teachers expect you to remember lots of words, dates, times, and other facts. Some don't have much meaning to us except they happened sometime in history and we're supposed to remember them. I designed the Word Memory task to simulate this.

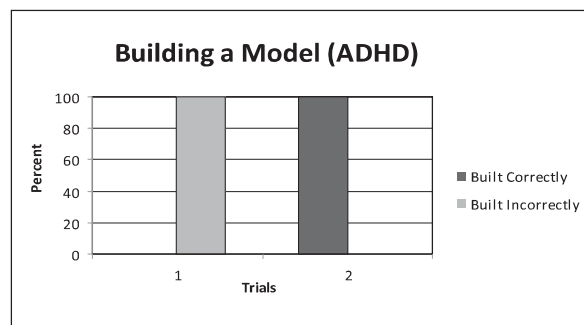
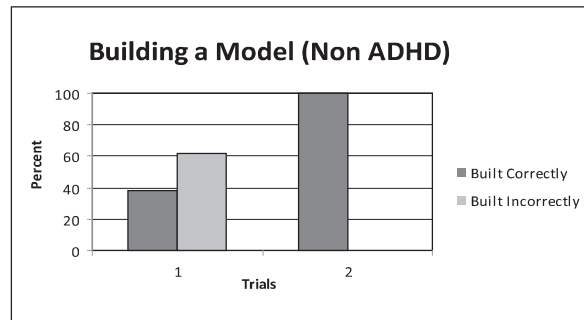
It took about an hour for a student to work through these tasks. I bought pizza and drinks to give them breaks throughout the session so they wouldn't get so tired. They were allowed to get up and move around between tasks.

There were three testers. Each tester tested the same task for all students so we could rule out a variation in how students were asked to perform the tasks. There were 16 students. Eight of the students were diagnosed as having ADHD and on medication at the time of testing. Eight of the students were non ADHD students. The students ranged in age from 8-15. There was a corresponding ADHD student and non ADHD student for each age group. This would help the results not to be skewed because of age differences. All students were currently enrolled in DODEA schools on Kadena Air Base, Okinawa, Japan.

### Data Analysis

I am going to talk about each of the three tasks given to the 16 students (8 ADHD and 8 Non ADHD) and what the data says about their performance. The

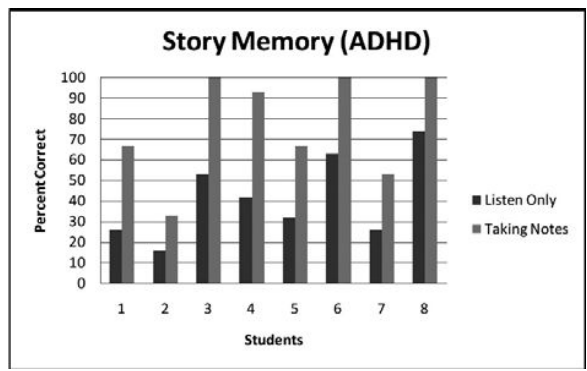
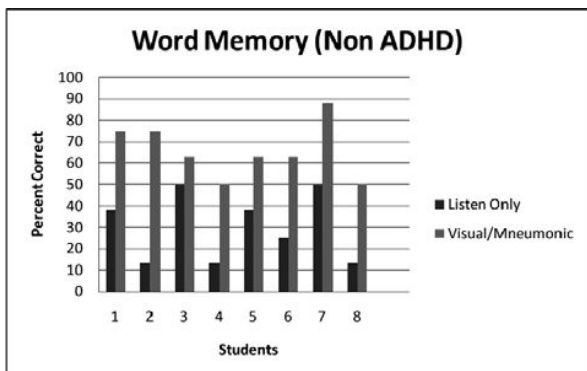
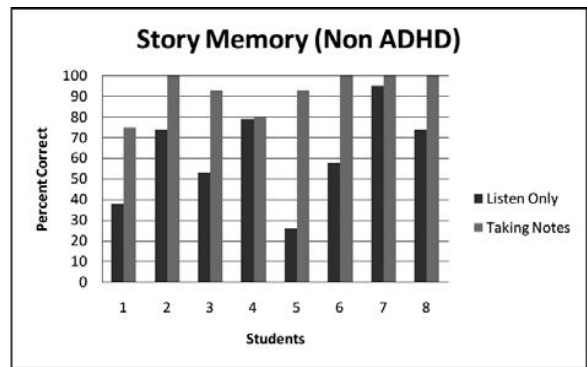
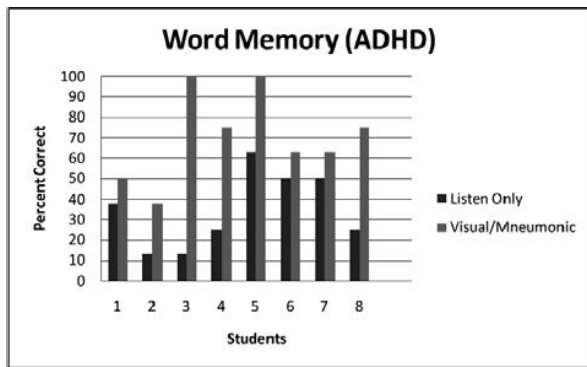
first task was Building a Model with LEGO bricks. The two charts reflect how the two subject groups (ADHD and Non ADHD) performed on trials one and two. Trial one showed how the students built the LEGO model only using written instructions. Trial two showed how the students built the LEGO model using a visual and with oral instructions.



On the first trial some of the Non ADHD students built the model correctly, but most did not (62%). When the Non ADHD students were given a visual to use when building the LEGO model the second trial, 100% of the students built the model correctly in under 5 minutes.

On the first trial, all the ADHD students built the LEGO model incorrectly. On the second trial, all the ADHD students built the LEGO model correctly.

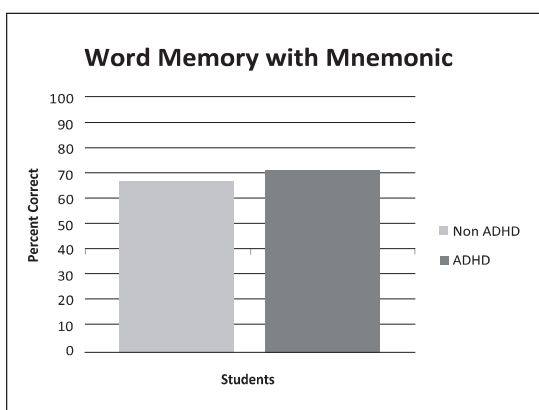
The second task was Word Memory where students had to memorize 8 words. The first time they did the task, they only listened to the words and had to write them down by memory, in order. The second time, they saw the words, said the words, and were given a mnemonic to use when writing down the words from memory.



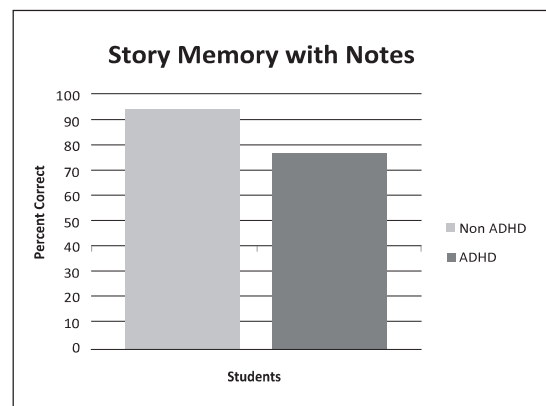
All of the Non ADHD students did much better on Word Memory when they were able to see the words, hear the words, and use the mnemonic I LOVE YOU. The same results applied to the ADHD students. When the Non ADHD students were compared to the ADHD students on the second trial for Word Memory, the ADHD students outperformed the Non ADHD students.

All Non ADHD students did better on Story Memory when they got the questions at the beginning of the story and were able to take notes. Half the Non ADHD students increased their scores at least 40% on the second reading.

All ADHD students also did better on Story Memory when they got the questions at the beginning of the story and were able to take notes. The ADHD students increased at a fairly even rate from the first to the second reading.



The third task, Story Memory, involved the tester reading a story excerpt to the student and the student answered questions at the end. The second time a story (different story) was read to the student, the student was able to take notes to answer the questions, and the questions were given to the student at the beginning of the story.



Comparing the Non ADHD students and the ADHD students on Story Memory with Notes, the Non ADHD students did better overall. There was a very uneven performance with the ADHD students. The average score for the Non ADHD

students was 93% as compared with the ADHD students, which was 77%.

## Conclusions

All students in this experiment did better with all three tasks when more than one strategy was used in the process of completing the task. The most amazing results were with the task Building a Model. No matter what type of learner you are, students do better at building a model when they can see a representative model, hold it, ask questions about it, and hear or see the directions on how to build it. Hands-on activities are most effective when a model is provided.

Memorizing words, especially after having just heard them, is a hard task for any student. The ADHD students did much worse with only listening than the Non ADHD students. This goes along with the research that says ADHD students have auditory deficits. Although Non ADHD students also had a hard time with memorizing words after only listening to them, they don't have as much of a problem with the memorization as the ADHD students. This tells me that it is especially important for ADHD students to provide a mnemonic device, written support, and an auditory cue to memorize well.

Answering questions about a story when your only exposure to it was listening to the teacher, is hard for all students. This is like being in a classroom and listening to a lecture and then taking a test on it. The results may not be so good. With task three, Story Memory, both groups did much better after taking notes while listening to the story and answering the questions. However, the Non ADHD students did better than the ADHD students, even with note taking. I think this is because writing and listening require two different skills at the same time and research tells us this is difficult for ADHD students. They need to focus on one task at a time and have it broken down into small pieces. Even though the ADHD students did better on the task with note taking, they could have done even better if the notes had been given to them before the story was read, and then answered the questions after the reading was done.

As an ADHD student, I have concluded that the best approach to learning is a combination of visual and auditory cues and hands-on activities

with a representative model to refer to. Lecture only as a method of learning is not effective for ADHD students, or any students, for that matter. Memorizing facts is almost useless unless there's a combination of strategies used such as a mnemonic.

We proved hypothesis one: Non ADHD students accomplished tasks with auditory instructions better than students with ADHD.

We proved hypothesis two: Both ADHD students and Non ADHD students completed the tasks with a higher score when multiple approaches to the tasks were

## Extension and Application

If I were to replicate this study I would make some changes. I would like to see if ADHD students could do even better with a story exercise when notes were given out before the story. This way, the students could concentrate on listening to the story, instead of writing.

I might try another approach to answering questions instead of writing down the answers. I know that ADHD learners usually do better talking than writing. I would ask the questions at the end of the story and record the answers. Then I would score the task. This is just one more way to see if the learner is comprehending the material that is being delivered.

I could easily replicate this study, and anyone else, too, because all the directions and tasks were well thought out. If I did it again, I would do it with a larger sample size. It's hard to get ADHD students to volunteer when you don't have a way to screen them to find out who they are. ADHD is a medical diagnosis and you have to be careful of confidentiality issues. I did this with friends of the family and community that we knew had the diagnosis. A larger sample size would better validate the results, but it would also be harder to get the numbers of ADHD students you would need.

It has been two years, now, since I began this study. From 2008 to 2010 I have created two presentations. The first is a Power Point presentation that highlights the study I did. I was invited to give this presentation to science classes at Kadena Middle School. Superintendent Ms. Martha Brown invited me to give this presentation to all the principals of the Department of Defense Dependent Schools on Okinawa in 2009.

The second presentation is a combination Power Point presentation and video presentation that I co-authored with my Mom. The presentation highlights the brain research on ADHD and effective teaching strategies to use with ADHD students. The video clips highlight testimonies from ADHD students and parents on what works and doesn't work for them at school. I gave a presentation with this Power Point/Video to a university class for aspiring teachers in November, 2010.

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## Appendices

### Chocolate Fever

Write two things that describe Henry Green

- 1.
- 2.

Describe something about Mark.

- 1.

Say two things about Elizabeth.

- 1.
- 2.

What happened at the beginning of the story?

What happened in the middle of the story?

What happened at the end of the story?

Name four things Henry ate for breakfast.

- 1.
- 2.
- 3.
- 4.

How does Henry like his chocolate?

- 1.
- 2.
- 3.
- 4.
- 5.

What did Henry put in his pocket to have as snacks at school?

- 1.

When Henry looked at his arm and the back of his hand, what did he see?

### Outline Notes on Who Moved My Cheese?

Give two characteristics for each character.

- |       |        |
|-------|--------|
| Sniff | Scurry |
| 1.    | 1.     |
| 2.    | 2.     |

Hem

Haw

1.

2.

2.

2.

Common (the same) things these four characters did.

How did the story begin?

What happened in the middle of the story?

How did the story end?

What did Hem and Haw do when they found there was no cheese at Station C?

What happened to Hem and Haw when they became so comfortable at Station C?

What did Sniff and Scurry do when it was time to change?

Task Score Sheet

Name of Student \_\_\_\_\_

Score with auditory prompt only

First Try

Score with auditory prompt, visual prompt, mnemonic device, paper and pencil

Second Try \_\_\_\_\_

Building with LEGOS

Build the model with written instructions only, limit of 5 minutes.

First Try:

Time:

Completed Correctly \_\_\_\_\_ Completed Incorrectly \_\_\_\_\_

Not Completed \_\_\_\_\_

Build the model with written instructions, and a visual model, no time limit.

Second Try:

Time:

Completed Correctly \_\_\_\_\_ Completed Incorrectly \_\_\_\_\_

Not completed \_\_\_\_\_

Reading Passage and Questions

Chocolate Fever: Number of questions answered correctly \_\_\_\_\_

Who Moved My Cheese: Number answered correctly \_\_\_\_\_



## 概 要

どのような学習法が課題の達成に 1 番良いのか：  
ADHD と非 ADHD の生徒に関する比較研究 2008-2010

### 1. 目的

この研究は ADHD と非 ADHD の生徒を両方テストし、どのような組合せの教育戦略が情報保持およびテストでの成果を最もあげるか知るために行いました。研究では ADHD の生徒は、非 ADHD の生徒と比べて「作業記憶」が悪い（彼らの脳の形および活動の生理学的な相違により）ことを示していました。この研究は、多くの ADHD の生徒が学校で成績が悪く、注意力が不足しているため高い才能を有するのに問題を起こしてしまうことから大変重要なものだと思います。

### 2. 手順

全ての科目を終了するために 3 つの課題を考えました。それぞれの課題は 2 問としました。最初に課題を与える時は、書面でまたは口頭のみで指示を与えました。2 度目に課題を与えた時は、(2 度目の課題は同じものではなく、思考力や難易度では同等なもの) 生徒は詳しい指示あるいは、手本を見る、またはメモを取ることができました。

課題 1 レゴブロックを使い簡単な模型を作る。時間を測定する。

課題 2 小学校 3 年生から 5 年生レベルの単語を 8 個記憶する。単語は書面で記録する

課題 3 物語を 2 つ(チョコレート・フィーバーと誰がチーズを動かした?)を聞かせてメモを取り、テストを行う。テストの正解率を記録する。

### 3. 結果

実験では、学習するために多数の学習方法が提供された時、全ての生徒が与えられた課題を良く達成することができました。学習するために講義するだけでは ADHD の生徒には有効ではありませんでした。ADHD の生徒は 1 つずつ課題に集中する必要がある、その課題を砕いて教えなければなりません。

### 4. 考察

仮説は 2 つとも立証できました。非 ADHD の生徒は、ADHD の生徒より聴覚による指示だけで課題をこなすことが出来ました。ADHD の生徒と非 ADHD の生徒、両方とも多数の学習法を提供した時高いスコアで課題を達成しました。先生は、一つ以上の学習法を用いて教える時に、どれくらい生徒達が学習できて、どれくらい保持できるのか知ることとはとても重要なことです。私のオリジナル研究で先生や校長先生に発表できるビデオを開発しました。