

What We Can Eat Instead of Meat

Meiwa Senior High School

1 Introduction

Figure 1: About meat problems^[1]



2 Background

Table 1: Meat substitutes

	<p>Soy meat</p> <ul style="list-style-type: none"> a meat substitute made from soybeans
	<p>Insect foods</p> <ul style="list-style-type: none"> Insects for eating High in protein, they are attracting attention as a meat substitute.^[2]
	<p>Cultured meat (Lab grown meat)</p> <ul style="list-style-type: none"> a meat substitute made from animal cells^[2] It is still under development.

3 Target

Examine effects on the environment, nutritional value, price, and taste of meat substitutes
 → Identify their features and differences

4 Method

Ingredients

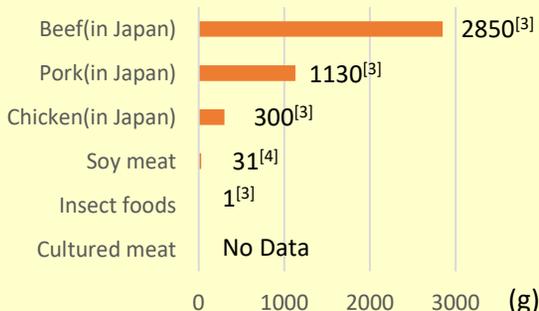
soy meat, insect foods(crickets), cultured meat

Perspective

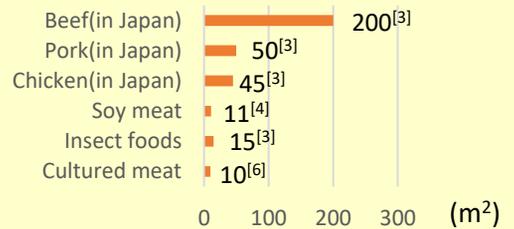
- The greenhouse gas they emit during their production processes per kilogram
- Land use per kilogram
- Price per gram
- Protein per gram
- Tastes (Soy meat and insect foods only)

5 Result

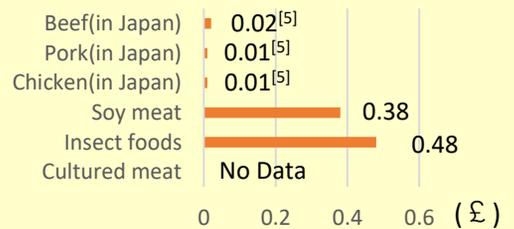
Graph 1: Greenhouse gas emissions per kilogram



Graph 2: Land use per kilogram



Graph 3: Price per gram



Graph 4: Protein per gram



Tastes

Soy meat a texture like meat, soybeans taste

Insect foods a hard texture, shrimps or nuts taste

Cultured meat the same texture to meat^[2]

6 Discussion

Soy meat

- Less land use → Can reduce deforestation
- About twice as much as protein than meat
- Expensive

Insect foods

- Can reduce greenhouse gas emissions greatly
- About three times as much as protein than meat
- Expensive
- Bad appearance

Cultured meat

- Less land use → Can reduce deforestation
- Hard to obtain
- Little data

7 Future Plan

Investigate **ease of processing and preservability** of them

Are there **other foods** that can be eaten instead of meat?

8 References

[1]Kodansha SDGs by C-station, 2022, (Retrieved February 20, 2025, <https://sdgs.kodansha.co.jp/news/knowledge/41031/>).

[2]Spaceship Earth, 2024, (Retrieved February 20, 2025, <https://spaceshipearth.jp/alternative-protein/>).

[3]Next Generation High Quality Insect Foods, 2019, (Retrieved February 22, 2025, <https://konchu-shoku.com/?mode=f2>).

[4]Soycle, 2022, (Retrieved February 20, 2025, <https://soycle.com/pages/environment/>).

[5]The Good Food Institute, 2024, (Retrieved March 1, 2025, <https://gfi.org/cultivated/>).

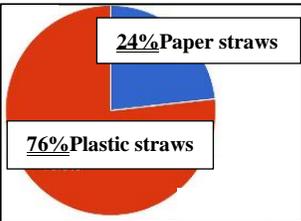
[6] Price changes based on the Retail Price Survey, 2025, (Retrieved March 1, 2025, <https://www.jpmarket-conditions.com/>).

New Material for Straws

Meiwa Senior High School

1 Introduction

Figure1. Questionnaire:
Which will you choose, paper straws or plastic straws? [1]

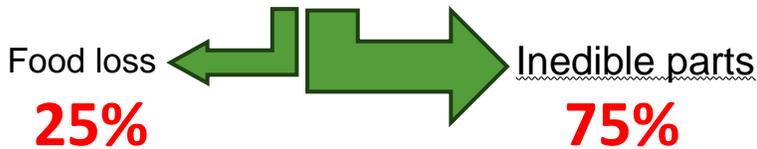


Recently, deforestation is proceeding, and is necessary to find a new material to substitute for wood. I focused on "straws".

My research goal:
To think of straws made from new materials to substitute for wood.

2 Background and Issues

Food Waste



Q1. Are inedible parts suitable as material for straws?

<Features>

- harmless to the human body
↑ originally a part of food
- highly waterproof (depending on processing) [2]
ex: architectural materials

No materials which is used as architectural materials processed into the thin shape is found.

Processing into paper by extracting fibers

Q2. What kind of greengrocery's inedible parts would be suitable as straws?

The performance required for making paper straws by the inedible parts

"liquid absorption"

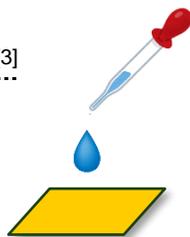
... It changes depending on which greengrocery being used

3 Experiment

1. Making paper from inedible parts [3]

<Compared materials>

- Onion peels
- Sweet potato peels
- Broccoli core



2. Examination of durability

Water droplets were dripped on the paper made and the water endurance time was examined.

4 Result

1. Onion peels/*¹Sweet potato peels/Broccoli core



*¹The sweet potato peels were cracked during the drying stage of papermaking, so the second step could not be performed.

2. Seconds passed from the start

Broccoli cores

Onion peels



0s(=Start)

89s
=Water Endurance Time of broccoli cores

324s
=Water Endurance Time of onion peels



5 Discussion

- Sweet potatoes are difficult to be processed into paper due to weakness against dryness.
- Some differences in properties between onion peels and broccoli cores
⇒ whether it is suberized or not [4]
...the deposition of a substance called suberin, which is hydrophobic, in the cell walls

6 Future Plan

- To conduct the same experiment with broccoli cores after being suberized and compare the results.
- To proceed with my research on the assumption of including the collaboration with a local workshop to revitalize the whole city.

7 References

- [1] MUJI Rescues Paper Straw Sufferers with a "Third Straw" Rave Reviews on the Internet
- [2] Success in Development of New Material Completely Vegetable-based from Waste Foodstuffs - Institute of Industrial Science, The University of Tokyo
- [3] How to make paper with vegetables? Let's make use of what we would otherwise throw away!
- [4] Plant cells

Natural Number Rubik's Cube

Meiwa Senior High School

Introduction

Making a new Rubik's Cube with **24 numbers**.
Its answer
→the **sum** of 4 numbers on each face are **equal**



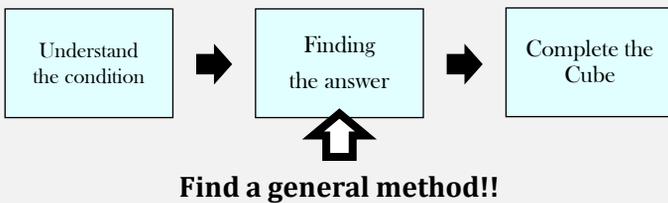
Background Knowledge

- $1+2+3+\dots+23+24=\sum_{k=1}^{24} k = 300$
- ∴ each sum would be $50(300 \div 6)$

1	10
18	21

- Initial condition \Leftrightarrow the condition of Rubik's Cube at the beginning

Main Target



Target 1

Confirm whether there are **multiple solutions** from an initial condition, or not.

Experiment 1

Making a Python program that **moves the Rubik's Cube randomly**.

Starting the program from the initial condition on the right (1)→

(1)

	24	8			
	13	5			
12	17	1	10	3	23
15	6	18	21	20	4
		7	22		
		19	2		

Result_1 Other solutions were found.

(2)

	8	5			
	24	13			
16	9	12	17	1	10
11	14	15	6	18	21
		19	7		
		2	22		

(3)

	16	7			
	24	3			
23	9	12	5	10	18
14	4	11	22	21	1
		2	20		
		15	13		

Discussion 1

- (2) and (1) are **essentially the same**.
- (3) is completely **different** from (1).
- Multiple solutions exist from the initial condition.

Target 2



Experiment 2

Making a program that **finds all groups of 4 numbers** from 1 to 24 whose **sum is 50**.

Ex) $(1) + (2) + (23) + (24)$

Result_2

Found **318 such groups**,
Ex) (10,11,12,17).

Experiment 3

Making a program that **generates all sets of 6 groups** from Experiment_2. The set must include all the natural numbers from 1 to 24 exactly once.

Result_3

Found **16,602 sets** of 6 groups,
Ex) ((1, 15, 16, 18), (2, 13, 14, 21), (3, 4, 19, 24), (5, 11, 12, 22), (6, 7, 17, 20), (8, 9, 10, 23))

Experiment 4

Making a program that **distributes groups** from sets from Experiment_3 across the 6 faces of a Rubik's Cube.
Each group can be placed in **30 different ways**.

Result_4

498,060 groups were generated.

Discussion

- Need to **convert the combinations** of 4 numbers from Experiment_2 into **permutations**.
- Each group of 4 numbers has $4! (= 24)$ permutations.
⇒ Each set of 6 groups from Result_4 has $(4!)^6 (= 191,102,976)$ possible permutations.
- The number of all solutions
⇒ $191,102,976 \times 498,060 = 95,180,748,226,560$



∴ It is **unrealistic to generate all the possible solutions**.

Future Plan

Introduce **additional conditions** to restrict the solutions

Reference

<https://www.nzherald.co.nz/entertainment/sudoku-puzzle-for-15-february-2007-medium/ULEXGRA6JND5EK7VMP5OQ3R5WQ/>
3/1/2025

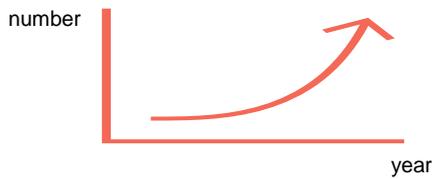
Child Abuse



Meiwa Senior High School

1. Introduction

The number of consultations about child abuse is increasing.^[1]



Number of consultations about child abuse ^[1]

2. Background

[2] Factors



Children Ex)Disabilities and premature babies
 Parents Ex)Mental instability
 Social Ex)Isolation from the community and economic anxiety

Four types^[2]



Physical abuse Sexual abuse
 Emotional abuse Neglect

In fact, child abuse is caused in urban areas more than in rural areas. ^[3]

3. Target



Difference in the number of child abuse in urban areas and in rural areas.

4. Investigation ①

Keeping living in a specific region



Networks with neighbors will be strong^[4]



Each prefecture(47)

Is out transfer rate higher in urban areas than in rural areas?

a) $\frac{\text{Out transfer}}{\text{The population}} \times 100 = \text{Per 100 people}$

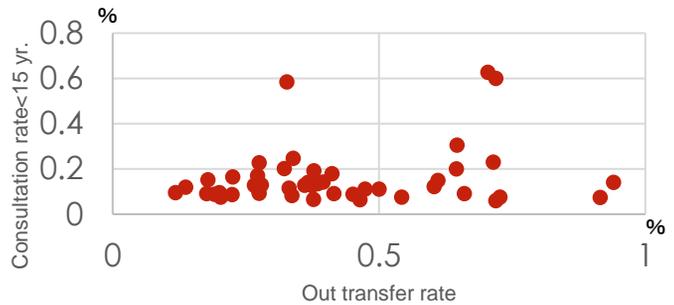
b) $\frac{\text{Consultation(child abuse)}}{\text{The population}<15\text{yr,}} \times 100 = \text{Per 100 people}$

References

[1] https://osaka-ohitani.repo.nii.ac.jp/?action=repository_action_common_download&item_id=573&item_no=1&attribute_id=22&file_no=2
 Tani, T., Yasuda, Y.(2022) Issues that can be seen from the difference between the current situation and perception of child abuse,4,9-15
 [2] <https://serve.repo.nii.ac.jp/record/2372/files/15.pdf> Yanagi,S(2017) Christianity and Studies: Essays, 9-1
 [3] <https://rchokkaido-on.repo.nii.ac.jp/record/102/files/V22P11-19.pdf>
 Yoshitani, Y et al.(2022) Bulletin of the Japanese Red Cross Hokkaido College of Nursing,22,12,14-15
 [4] https://chukyo-u.repo.nii.ac.jp/?action=repository_uni&item_id=17776&file_id=548&file_no=1
 Kida,Y et al.(2019) Bulletin of the Faculty of Contemporary Social Studies, Chukyo University,13(2)8-23
 [5] https://www.jstage.jst.go.jp/article/jps/53/0/53_23/_article-char/ja Koike,S (2017) Humanities and Oral Studies ,53,38
 [6] https://www.jstage.jst.go.jp/article/ejgeo/13/1/13_87/_article-char/ja Inoue,T(2018) E-journal GEOVol.13(1),93
 [7] 統計情報ホームページ/統計トピックスNo.94我が国のこどもの数・「こどもの日」にちなんで、「人口推計」から。
 Ministry of Internal Affairs and Communications(2016)
 [8] Shimizu, M (Interregional comparison of child abuse)
 <323739203330385F8ED089EF95D88FE18CA48B865F817990B49085817A5F344B2E736D64> February 26, 2025.
 [9] <https://doi.org/10.24201/takikawa.3.2-01> Takikawa, K(2019) Keishin Research Journal, 3(2),3-5

5. Result

Fig.1 Out transfer rate and consultation rate ^{[3],[5],[6],[7]}(2015) correlation



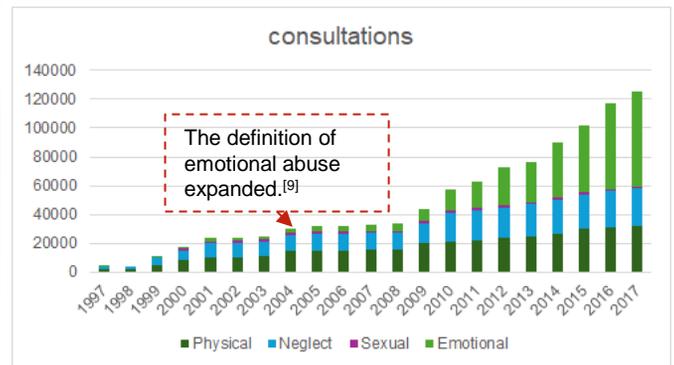
6. Discussion ①

All urban areas ≠ Higher transferring rate
 Transferring rate does not relate to the number of consultation rate about child abuse. The rate is not a factor that makes a difference.
 Maybe→possible to make networks with neighbors strong

7. Investigation ②

Are there any other reasons for child abuse?
 Let's take a closer look at it.

Fig.2 Trends in the number of abuse consultation cases by type^[9]



Emotional abuse→Increasing the most!

Child abuse consultation cases per 1,000 children<20 yr. (prefecture)^[8]

Emotional abuse

→The dispersion of the data is the greatest.

Urban areas > Rural areas

8. Discussion ②

The number of consultations is larger in urban areas.

Possible reasons:

- Urban areas are **more sensitive to emotional abuse** than rural areas^[8]
- Urban areas have weaker networks with neighbors and people jump to call the authority

9. Future Plan

Study other causes of difference in the number of child abuse and in urban areas and in rural areas.

The Stability of the Gyroscope

1. Introduction

The gyroscope is stable because of the gyroscopic effect. I wondered how stable it is and wanted to check the stability of the gyroscope with figures in my own way.

2. Background ^{[1][2]}

Gyroscope: A Japanese science toy that utilizes the gyroscopic effect. A kind of spinning top.

Gyroscopic effect: The phenomenon that a rotating object tries to keep its position, for example, bicycle.



Fig. 1 Rotating Gyroscope

3. Hypothesis

When a force is applied to the gyroscope, there comes a point where it will fall. Investigate tipping point.

4. Method ^①

Materials: Gyroscope, BB bullets, timer, ruler, slingshot

Hit a BB bullet to the gyroscope by expansion and contraction of a rubber band while it remained stable on the stand.

Let the strength of the rubber band is stretched be X.

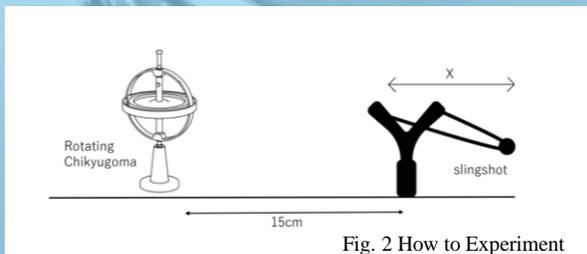


Fig. 2 How to Experiment

The average duration of a rotating the gyroscope remained standing ⇒ About 40 seconds

Experiment was done within 30 seconds

5. Result

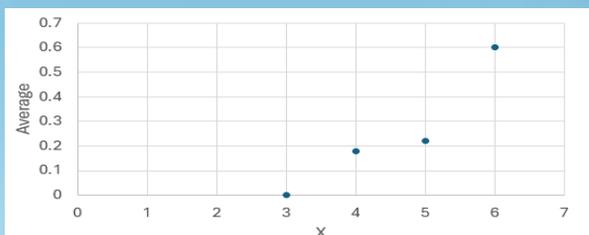


Figure.3

Fell⇒1, Not fell⇒0

Bullets do not always hit the gyroscope, so I recorded only the time bullets could hit the gyroscope.

6. Discussion ^①

The point where the gyroscope falls could not be specified.

7. Method ^②

Guess the power by law of conservation of mechanical energy.

$$F\Delta t = mv' - mv$$

F=force, Δt =the contact time, m;mass, v; velocity

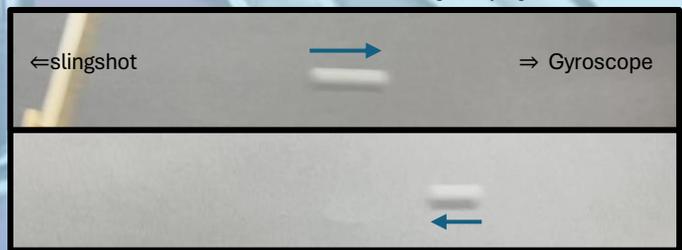
Taking video of the flying bullet ⇒ The velocity can be predicted.

t was assumed to be 0.0005 seconds.

✕When playing tennis, the contact time between the ball and the racket is said to be 0.0005 seconds.^[3] Based on this time, the time is assumed to be 0.0005 seconds.

8. Result ^②

Fig. 4 Flying Bullet (X=3)



$$F = \frac{mv'}{\Delta t} - \frac{mv}{\Delta t}$$

$$m=0.00025\text{kg} \quad v'=0.78\text{m/s} \quad v=0.47\text{m/s} \quad \Delta t=0.0005\text{s} \\ \Rightarrow F=0.155\text{N} \approx 0.16\text{N}$$

9. Discussion ^②

The gyroscope can withstand a force of **0.16N**.

10. Future plan

The bullets did not always hit the gyroscope, so I will improve the tool.

Examine average when X = 3.1, 3.2... and explore the range average = 0. Find F more precisely.

11. Reference

[1] Mori Hiroshi (2024) "Why doesn't a spinning frame fall over? The Mysterious Nature of the "Gyro Effect" - Gyro Monorail" <https://www.gentosha.jp/article/25102/> 19/Feb/2025

[2] Denmira (2014) "Farewell to the Nostalgic Toy "Chikyugoma," the 94-year history of which is coming to an end due to aging craftsmen..." <https://denmira.jp/?p=7356&%3A~%3Atext=> 18/Feb/2025

[3] KAWAZOE-LAB(2023) "The Science of Tennis Rackets (582): Spin and Ball Speed at Impact..." https://kawazoe-lab.com/tennis_racket/science-of-tennis-racket-582/ 19/Feb/2025

Antibacterial Effects of Chameleon Plants

1. Introduction

Do Chameleon plants really have antibacterial effects?

2. Background Knowledge

Components of Chameleon plants (According to Reference[1][2][3][4][5])

Component	Effect/Odor/Taste
Decanoyl acetaldehyde C ₁₂ H ₂₂ O ₂	Bactericidal effects, Harsh taste material
Lauryl aldehyde C ₁₂ H ₂₄ O	Bactericidal effects, Harsh taste material

- Bacteria that exhibit the effects of antibacterial ingredients
Staphylococcus aureus, *Escherichia coli* (Reference[6])
- Resident bacteria on hands
Staphylococcus aureus species > *Escherichia coli* > *Salmonella* species (Reference[6])

3. Target

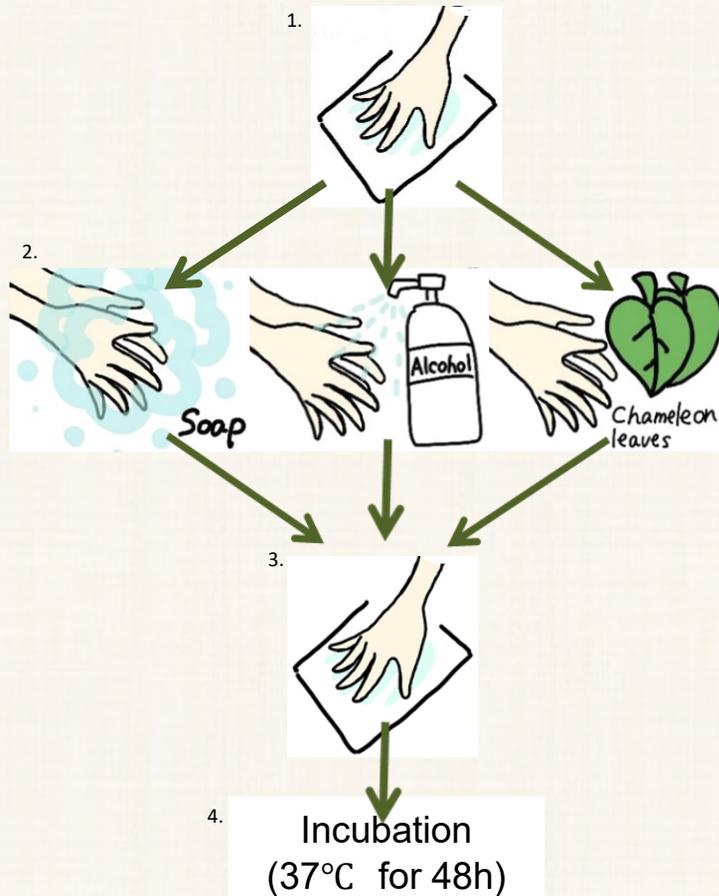
Examine the effectiveness of chameleon leaves for common disinfection methods.



4. Method

1. Tap hands before washing to SCD agar medium
2. Washing hands (three conditions)
3. Tap hands after washing to SCD agar medium
4. SCD agar mediums in a 37°C incubator for 48 hours

SCD→Soybean Casein Digest



5. Result

Comparison of bacterial growth status on SCD agar medium

How to wash hands	Hand before experiment	Hand after experiment
Soap		
Alcohol		
Chameleon leaves extract liquid		

Washing with Chameleon leaves did not exhibit antibacterial effects.

6. Discussion

The results were unexpected.

- (1) There may have been a problem with the disinfection method using chameleon leaves.
- (2) Chameleon leaves were contaminated more than necessary. Bacteria that are outside the antibacterial effects of Chameleon plants may have been on the leaves.
- (3) Chameleon plants were not in season.

7. Future Plan

- Inspect the result using leaves in season.
- Inspect the possibility of a natural disinfectant by combining Chameleon leaves with herbs that compensate for the unbalanced antibacterial effects.

8. References

- [1]Okada Minoru (2002) *Wakanyakusodaizukan* Hokuryukan [2]Suzuki You (2016) *Chinese medicine encyclopedia ~shouyaku, herbs, folk medicine ~Ishiyakushuppan* [3]Kinoshita Takeshi (2015) *Rekidainihonyakkyokuhosusai* Gaia Books [4]Shirataki Yoshiaki (2016) *Wildflowers -Edible and medicinal properties of familiar wild plants-* 58 (6)24—25 [5]Imokawa Hiroshi *Analysis of the bactericidal effect of chameleon plants* [6]Nakamuro Katsuhiko (2014) *Behavior of resident skin bacteria and identification of residual bacteria during hand washing and disinfection process*

Turning our Preconceptions into Social Benefits

2nd year of Meiwa High School

1. Introduction

Waste is often **not separated**, although various initiatives have been taken. (Fig. 1)

Purpose

Using **colour** to solve the waste problem



2. Background

A preconception

→ a previously held **bias** about individual or social behaviour



Fig. 2 Colour association (Yanase, 1997)

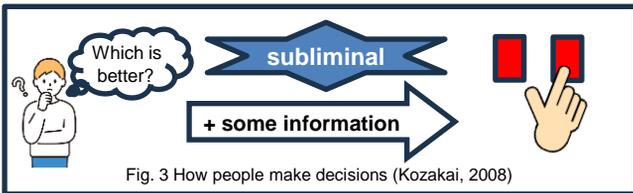


Fig. 3 How people make decisions (Kozakai, 2008)

3. Hypothesis I

People decide what colour bin to put their waste in based on **colour association**. (Fig. 4)



Fig. 4 Prediction I

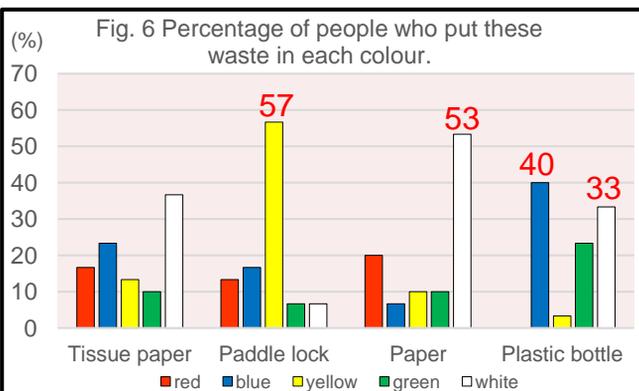
4. Experiment I

Thirty first- and second- year students from Meiwa High School took part. Then, we asked them to put waste into bins **intuitively**.



Fig. 5 The things for the experiment I

5. Result I



6. Discussion I

The result was not as expected.

Possible reasons...

People do **not consider** the **type** of waste.
Paddle lock is **yellowish**, and the **paper** is **white**.

7. Hypothesis II

People tend to **match** the colour of waste and the colour of bin **regardless of** the type of waste. (Fig. 7)



Fig. 7 Prediction II

8. Experiment II

Number of participants: 30 → 100

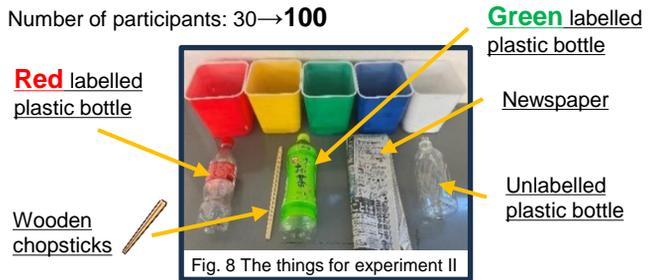
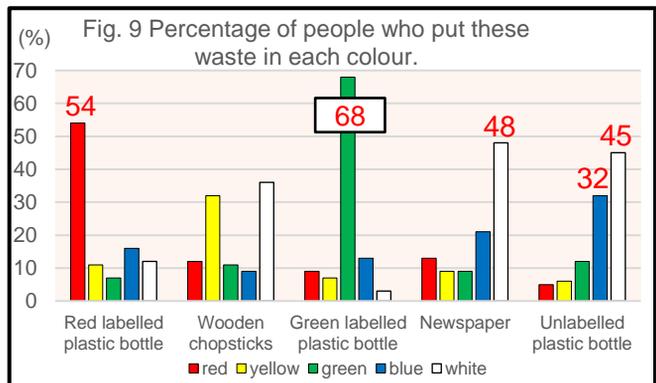


Fig. 8 The things for experiment II

9. Result II



10. Discussion II

The result was as expected!!

But there are **limits** to this trend

Not all waste is the **same** colour

11. Future Plan

Cardboard waste is not often separated at our school festivals

Changing bin colour to **brown**

Helping students know which bin they should put cardboard into (Fig. 10)

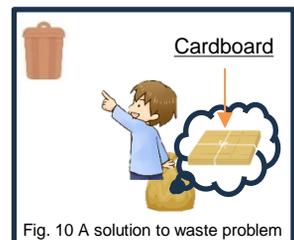


Fig. 10 A solution to waste problem

12. References

Kozakai Toshiaki. (2008). *The fiction of responsibility*. University of Tokyo Press.
Tetsuo Yanase. (1997). Quantitated Study of Color Image. The visualization Society of Japan, 17 (64), 18-22.

Reducing the Noise of a Fan



Meiwa Senior High School

1. Introduction

I want to find out how to reduce the noise of the fans. This is why I started this research.

2. Background

● What is vortex generator?

Vortex generator is a part that generates swirling air like a small tornado when it is in areas where air flow occurs. (Fig.1)

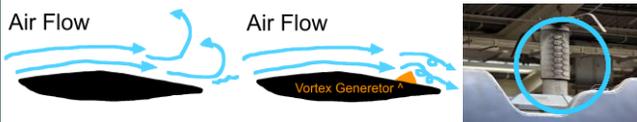


Fig.1 Image of vortex generator

Fig. 2

3. Hypothesis

My hypothesis is that the source of the noise is the ducts and improving the air current around there can reduce noise.

4. Experiments

1. Making parts (1), (2), (3) (Fig.3)

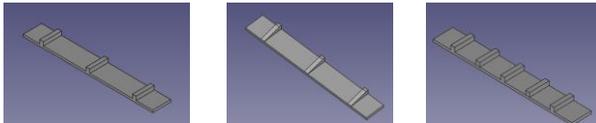


Fig. 3 - (1)

Fig. 3 - (2)

Fig. 3 - (3)

2. Recording the frequency and volume of the noise. (Fig.4)



Fig. 4

3. Testing several conditions.

- ① Without any parts added (Fig.5 - ①)
- ② in a discharge outlet with part(1) (Fig.5 - ②),
- ③ in a discharge outlet with part(2) (Fig.5 - ③),
- ④ in a discharge outlet with part(3) (Fig.5 - ④)

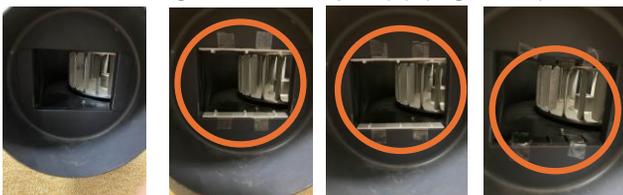


Fig. 5 - ①

Fig. 5 - ②

Fig. 5 - ③

Fig. 5 - ④

4. Comparing the noise data of the fan.

5. Result

Fig.6 shows the relationship between frequency and dB values.

Fig.7 shows the details of noise frequency.

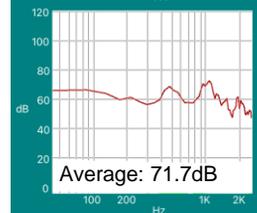


Fig.6 - ①



Fig.7 - ①



Fig.6 - ②

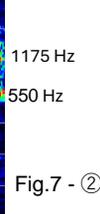


Fig.7 - ②

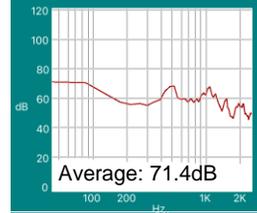


Fig.6 - ③

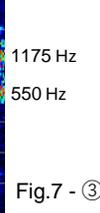


Fig.7 - ③

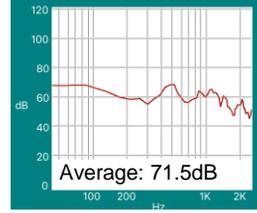


Fig.6 - ④



Fig.7 - ④

6. Discussion

According to Fig.6, dB value of ②~④, with parts installed is smaller than ①, without any parts added. Also, strong frequency spectrum near 1150~1200 Hz arised in all conditions but in ②~④, it is reduced and spread. This may be caused by vortex generators.

7. Future Plan

I would like to try more different shapes of vortex generators that reduce much noise. I would also like to install vortex generators in other areas (blades and intakes) to check its effectiveness.

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Inheritance and Preservation of traditional cultures

Meiwa Senior High School

1.Introduction

The number of cultural bearers is decreasing (causes)

- Ageing society
- Changes of lifestyles and religious views

We started to study about "Higashi-ku Dashi Matsuri" as an example.[1]

2.Background Knowledge

(1)Dashi

Large decorated Japanese float used in festivals



fig1-1



fig1-2

(2)Matsuri

Means "festival" in Japanese

(3) Higashi-ku

Name of region where our school is located



fig2

(4)Edo period and Meiji period

Japanese period classification.

Edo period (about 1600~1867)

Meiji period (about 1868~1911)

3.Target

- (1) To find out roots of "Higashi-ku Dashi Matsuri" and how it differs from other festivals in Aichi.
- (2) To look for an effective way to inherit this festival.

4 .Method

- (1) Literature Review
- (2) Survey among students in our school

5. Result

(1)Literature

①History

<Edo period>

"Nagoya Three Large Festival" using Dashi began.

Became the origin of most festivals in Aichi.

<Meiji period>

Dashi were sold due to economic reasons.[3]

②Religious mind

The religious view of Japanese

God is present in everything

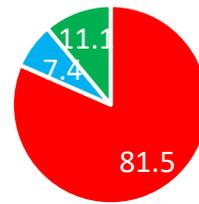
←→ Religions that value on ritual (Hayashi 2010)[4]

What we should do to inherit cultures

- Works of local government
- Systems to increase bearers (Ishikawa 2004)[5]

(2)Survey

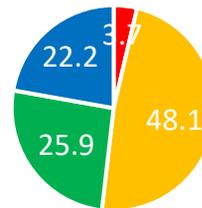
Have you ever taken parts in your local festival?(%)



More than 80% of the students have taken parts in festival. (fig3)

■ Yes ■ No ■ I don't know

Rate your interest in traditional cultures on four levels. (1 is the lowest, 4 is the highest)(%)



About half of the students have interest in local traditional cultures. (fig4)

■ 4 ■ 3 ■ 2 ■ 1

6.Discussion

Elementary school and community center are the best to raise bearers

Experience of participating in the cultural events
≠improve students' interest in tradition

- × Simply to get the children to participate in the festivals
- To tell them about the background of it
- To get them interested in the culture itself

7.Future Plan

- Teach about this festival to children
- Do more survey to investigate how they were taught about culture in their childhood.

8. References

[1]<https://higashiku-dashi.or.jp/>

[2]<https://engimono-note.com/matsuri/>

[3]Tsuda Toyohiko.(2001) Newly Revised Nagoya City History No9

[4]Hayashi Fumi (2010) Faith and religious spirit for latest Japanese. Statistical Mathematics. 58(1),39-59

[5]Ishikawa Nao(2004) Factors in the Continuation of Bullfighting in Uwajima District Southwestern Japan, with Special Attention to the Actors Involved in a Traditional Events

[6]Iguchi Satoshi(2019) Transformation of the Festival and Community Conflict, Kyoto Journal of Sociology XXVII

The Relationship between MBTI and the Neatness of the Handwriting

Meiwa High School

1. Introduction

• None of the study focused on the connection between personality and the neatness of the handwriting

2. Background

About MBTI

• Distinguishes into 16 different personalities

Ex. INFJ, ISFJ, ENFP,,,,

2nd letter of MBTI

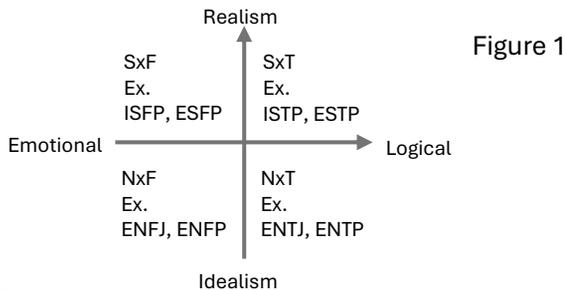
Table 1

N (iNtuition)	Tend to focus on abstract concepts and future possibilities, idealism
S (Sensing)	Tend to think according to concrete fact or experience, realism

3rd letter of MBTI

Table 2

F (Feeling)	Tend to place a premium on values and peoples' feelings, emotional
T (Thinking)	Tend to attach importance on logics or objective data, logical



3. Target

Does the difference of MBTI affect how neat one's handwriting is?

*We defined neat handwriting according to the models in the Kanji workbook.

*Kanji is a logographic Chinese character used in Japanese writing.

4. Experiment

<Target of the experiment>

Japanese male and female of the age of 16 and 17 from Meiwa high school.

<About survey>

Question 1. MBTI

Question 2. Write 田

*田 is a type of kanji

<Analyzing the samples>

Figure(2-4) shows the process of analysis.

The higher the overlap ratio of the sample, the neater the handwriting.



Figure 2



Figure 3

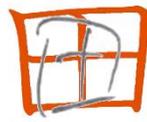


Figure 4

• Blue dot shows the criteria point of the overlapping process.

5. Result

• Figures below show how the word with minimum, median, maximum overlap ratio looks like



16%



43%



77%

Table 3

	NxF	NxT	SxF	SxT	Overall
Samples	35	9	18	6	68
Max(%)	59%	56%	67%	77%	77%
Min(%)	16%	18%	17%	18%	16%
Average(%)	39%	36.9%	33.8%	41.2%	37.5%
Median(%)	39%	34%	34%	42%	37%

• According to Smirnov-Grubbs test (Specific number minus average divide by standard deviation) all the maximum numbers are not an outlier (5% p value)

6. Discussion

• SxT had the highest average, maximum overlap ratio.



People with SxT has a possibility of writing the word neatly.

• Only 6 people had the combination of SxT



Bias of data may have swayed the result

7. Future Plan

• To minimize the bias among the data, we are conducting an additional research.

• Expand the research to number, alphabet and hiragana too.

*Hiragana is a Japanese character.

8. References

- [1]Rashi Kacker and Hima Bindu Mariganti. (2012). Personality Analysis Through Handwriting. GSTF Journal on Computing (JOC), 2(1), 94-97[1]
- [2]Gavrilescu and Vizireanu. (2018). Predicting the Big Five personality traits from handwriting. EURASIP Journal on Image and Video Processing, 57
- [3]Lynn Lee. (N/A). MBTI Personality Types and their Handwriting <https://graphology.scry3d.com/mbti-personality-types-and-their-handwriting/>
- [4]The Myers-Briggs Company. (N/A). 16Personalities <https://www.16personalities.com/>