


A close-up photograph of a hand holding a blue pen, writing on a spiral-bound notebook. The background is blurred, focusing attention on the hand and the pen. The text is overlaid on the right side of the image.

Why-What-How: 研究思路建構

Why do we need a
Storyboard
for research communication?

徐惠玲
ies Research

A close-up photograph of a hand holding a blue pen, writing on a notepad. The background is dark and out of focus. The text is overlaid on the image.

Why do we need a

Storyboard

for research communication?

It helps you organize your thoughts. Making a storyboard helps you condense all the ideas bouncing around your head into one coherent, fleshed-out vision. It helps you to convert research story into media effectively.....

Why do we need a Storyboard

Organizing thoughts throughout the research process

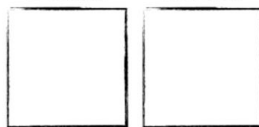
Your Storyboard



(1) **Ideal** (2) **Reality**



(3) **Problem** (4) **Solution**



A Role for Parasites in Stabilising the Fig-Pollinator Mutualism

Abstract
 Parasites are thought to be important in stabilising mutualisms. However, whether parasites contribute to stabilising mutualisms remains unclear. We tested this hypothesis using a mutualism between figs and their pollinators. We found that parasites do not contribute to stabilising mutualisms. Instead, they appear to destabilise mutualisms. Our results suggest that parasites may play a role in the evolution of mutualisms, but that their role is not necessarily stabilising. We discuss the implications of our findings for the evolution of mutualisms and the role of parasites in stabilising mutualisms.

Introduction
 Mutualisms are thought to be important in stabilising mutualisms. However, whether parasites contribute to stabilising mutualisms remains unclear. We tested this hypothesis using a mutualism between figs and their pollinators. We found that parasites do not contribute to stabilising mutualisms. Instead, they appear to destabilise mutualisms. Our results suggest that parasites may play a role in the evolution of mutualisms, but that their role is not necessarily stabilising. We discuss the implications of our findings for the evolution of mutualisms and the role of parasites in stabilising mutualisms.

Discussion
 Our results suggest that parasites may play a role in the evolution of mutualisms, but that their role is not necessarily stabilising. We discuss the implications of our findings for the evolution of mutualisms and the role of parasites in stabilising mutualisms.

Plain Language Summary

Infographic

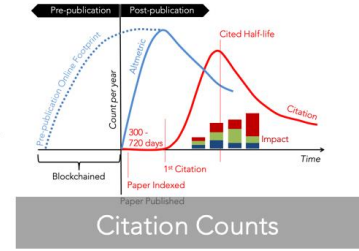
Graphical Abstract

Video Abstract



SOCIAL MEDIA ANALYTICS

Online Footprint/Visibility



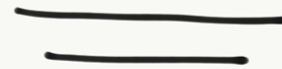
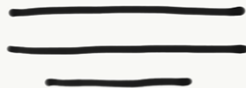
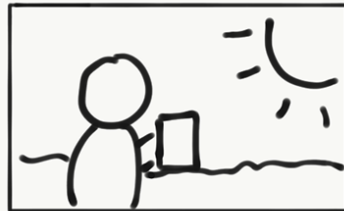
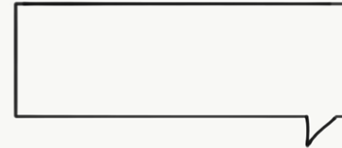
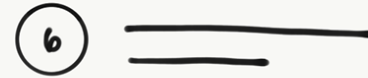
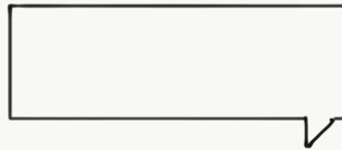
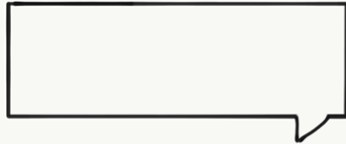
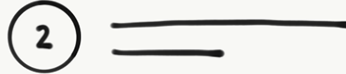
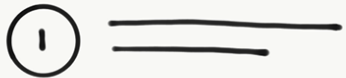
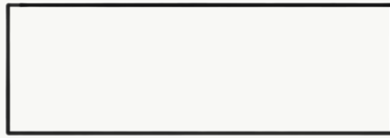
SUSTAINABLE DEVELOPMENT GOALS

Citation Counts



PERSONA: KELLY

USER STORY: RECORD MILEAGE WHILE ON AN OUTDOOR RUN



Make your Story Compelling

Organizing thoughts throughout the research process



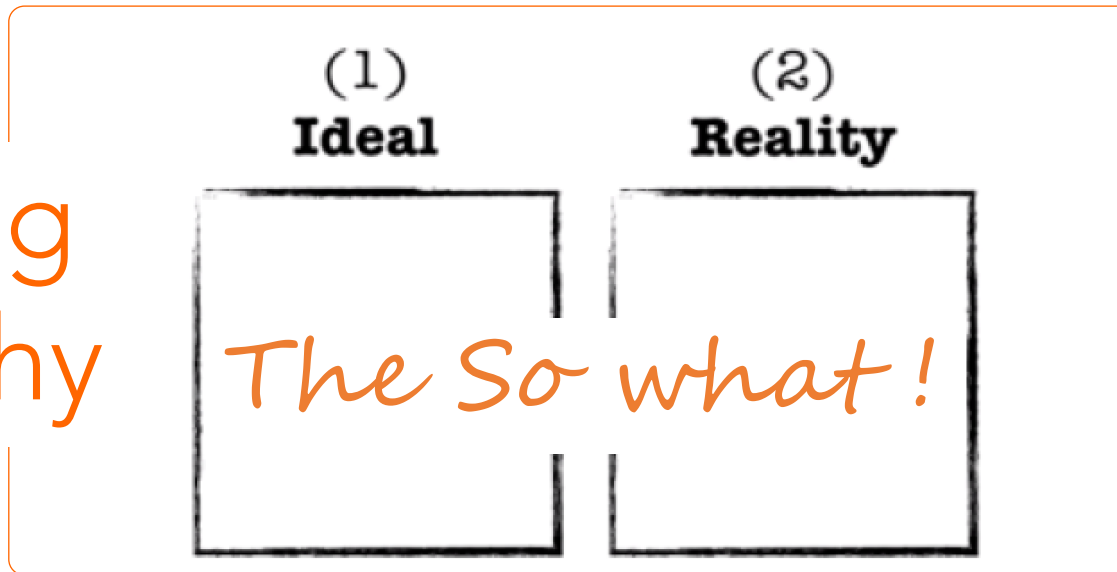
1. Start by making your audience care
2. Explain your idea clearly and with conviction
3. Describe your evidence and how and why your idea could be implemented
4. End by addressing how your idea could affect your audience if they were to accept it

WHY

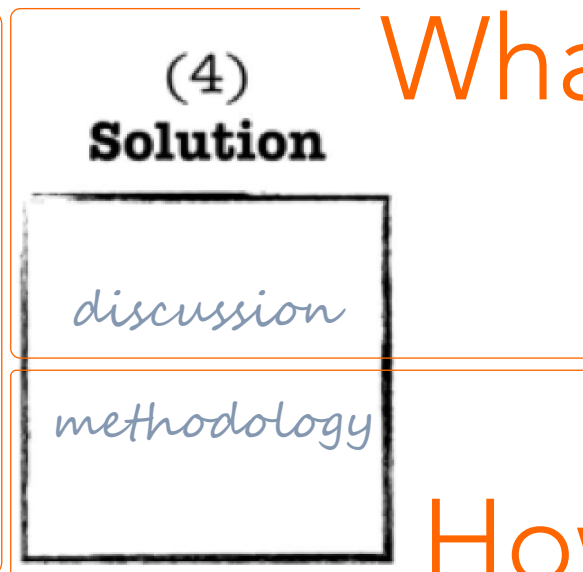
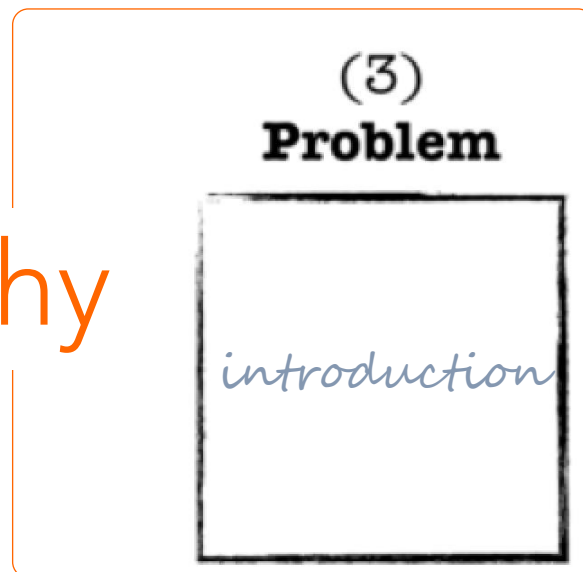
WHAT

Big WHY

Big
Why



Why



What

How



WHY

INTRODUCTION

Thesis Statement

- Topic
- Stance
- Rationale

To Sharpen

WHAT

DISCUSSION

+ CONCLUSION

- Contributions
- Avenues
- Change
- Levels

To Organize

HOW

METHODOLOGY

Organizing thoughts using Storyboard

Extraction from Research Paper to Storyboard

OPEN ACCESS Freely available online

PLOS BIOLOGY

A Role for Parasites in Stabilising the Fig-Pollinator Mutualism

Derek W. Dunn^{1,2,3}, Simon T. Segar^{1,2}, Jo Ridley³, Ruth Chan¹, Ross H. Crozier⁴, Douglas W. Yu⁵, James M. Cook^{1,2,3*}

1 Division of Biology, Imperial College London, Ascot, United Kingdom, **2** School of Biological Sciences, University of Reading, Reading, United Kingdom, **3** School of Biological Sciences, University of East Anglia, Norwich, United Kingdom, **4** School of Marine and Tropical Biology, James Cook University, Townsville, Queensland, Australia, **5** Natural Environment Research Council (NERC) Centre for Population Biology, Imperial College London, Ascot, United Kingdom

Mutualisms are interspecific interactions in which both players benefit. Explaining their maintenance is problematic, because cheaters should outcompete cooperative conspecifics, leading to mutualism instability. Monoecious figs (*Ficus*) are pollinated by host-specific wasps (Agaonidae), whose larvae gall ovules in their "fruits" (syconia). Female pollinating wasps oviposit directly into *Ficus* ovules from inside the receptive syconium. Across *Ficus* species, there is a widely documented segregation of pollinator galls in inner ovules and seeds in outer ovules. This pattern suggests that wasps avoid, or are prevented from ovipositing into, outer ovules, and this results in mutualism stability. However, the mechanisms preventing wasps from exploiting outer ovules remain unknown. We report that in *Ficus rubiginosa*, offspring in outer ovules are vulnerable to attack by parasitic wasps that oviposit from outside the syconium. Parasitism risk decreases towards the centre of the syconium, where inner ovules provide enemy-free space for pollinator offspring. We suggest that the resulting gradient in offspring viability is likely to contribute to selection on pollinators to avoid outer ovules, and by forcing wasps to focus on a subset of ovules, reduces their galling rates. This previously unidentified mechanism may therefore contribute to mutualism persistence independent of additional factors that invoke plant defences against pollinator oviposition, or physiological constraints on pollinators that prevent oviposition in all available ovules.

Citation: Dunn DW, Segar ST, Ridley J, Chan R, Crozier RH, et al. (2008) A role for parasites in stabilising the fig pollinator mutualism. *PLoS Biol* 6(3): e59. doi:10.1371/journal.pbio.0060059

Introduction

In a biosphere driven by selection at the level of the individual gene [1], explaining the existence of cooperation, such as mutualism, is a major scientific challenge. Mutualisms are interspecific ecological interactions characterised by reciprocal benefits to both partners [2] that usually involve costly investments by each. What factors thus prevent one partner from imposing unsustainable costs onto the other to enable mutualism stability [3–7]? In some mutualisms, the larger, more sessile partner, manipulates the other by directing benefits to cooperative individuals and costs to cheaters [4–7]. However, a general consensus on mutualism persistence has only recently been formulated, and this clearly shows that a high benefit-to-cost ratio of cooperating is one important factor [8,9].

Fig trees (*Ficus*) and their host-specific agonid pollinator wasps are a classic example of an obligate mutualism [10,11]. The wasps pollinate the trees, and the trees provide resources for wasp offspring. In monoecious *Ficus*, female wasps push their way through a specialised entrance into receptive syconia (colloquially, "figs"), which are enclosed inflorescences. The wasps then pollinate the tree while depositing their eggs individually into ovules. Thus, each egg laid costs the tree one seed, but upon emergence, the female wasp offspring disperse that tree's pollen. Trees need to produce both wasps and seeds for the mutualism to persist, but natural selection should favour wasps that exploit the maximum number of fig ovules in the short term, resulting in a conflict of interest between wasp and tree. However, the mutualism has persisted for at least 60 million years and has radiated into more than 750 species pairs [12]. The mechanisms preventing wasps

from overexploiting figs remain unknown, despite intensive study over four decades.

Within receptive syconia, the lengths of floral styles are highly variable [13,14], and ovipositing pollinators (foundresses) favour flowers with shorter styles for their offspring [15–18]. Style and pedicel lengths of flowers are negatively correlated. Short-styled ovules develop into seeds or galls (when a wasp is present) near the syconium inner cavity, while most long-styled ovules develop into seeds near the outer wall [19,20] (Figure 1). These patterns have been shown to reflect the oviposition preferences of foundresses, and are unlikely to be the result of greater elongation of pedicels containing eggs during syconial maturation, because in receptive syconia, pollinators' eggs are mainly present in short-styled inner ovules [16]. These widespread observations have been tied to four, not necessarily mutually exclusive, mechanisms that have been proposed to stabilise the fig-pollinator mutualism: (1) Unbeatable seeds—mature ovules may be defended biochemically or physically against oviposition or larval development [21]. However, no mechanism has yet been identified. (2) Short ovipositors—pollinators' ovipositors may be too short to fully penetrate the long styles of

Academic Editor: Anurag A. Agrawal, Cornell University, United States of America
Received: September 14, 2007; **Accepted:** January 22, 2008; **Published:** March 11, 2008

Copyright: © 2008 Dunn et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abbreviation: s.e., standard error

* To whom correspondence should be addressed. E-mail: james.cook@reading.ac.uk

iStory
The Storyboard



Big
Why

Why

What

How

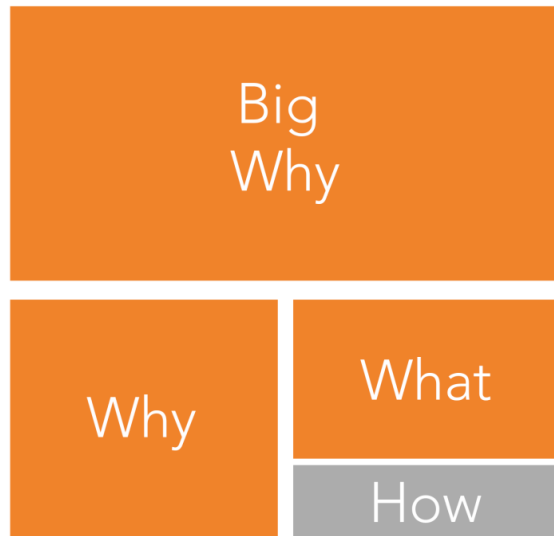
Organizing thoughts using Storyboard

The Big Why: Addressing the Bigger Problem

iStory

The Storyboard

The So what!

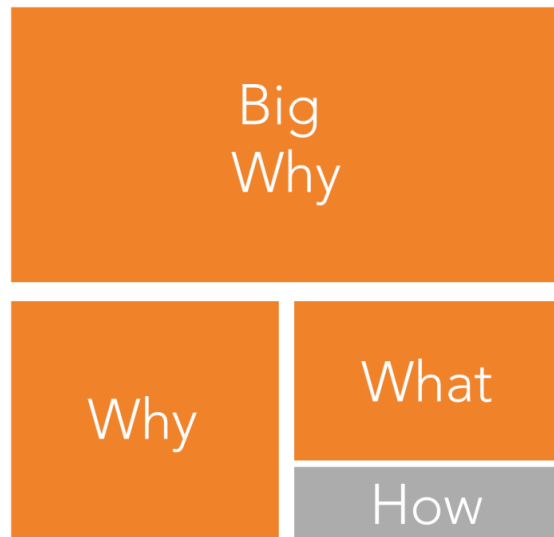


Connect audience with what they care

Organizing thoughts using Storyboard

The Why: Thesis Statement

The Storyboard



What is a Thesis Statement?

- A single sentence that is located at the end of your introduction.
- Tells the reader what your opinion is and what paper is going to prove.
- Directs your reader to the main pieces of evidence you will explore.

Example

Psychologists have argued for decades about how a person's character is formed. Numerous psychologists believe that one's birth order (i.e. place in the family as the youngest, oldest, or middle child) has the greatest influence. I believe birth order can have a significant impact in the formation of a child's character based on my own experience growing up in a family of four children. Birth order can strongly affect one's relationship with parents, relationships with others, and how one views responsibility as an adult.

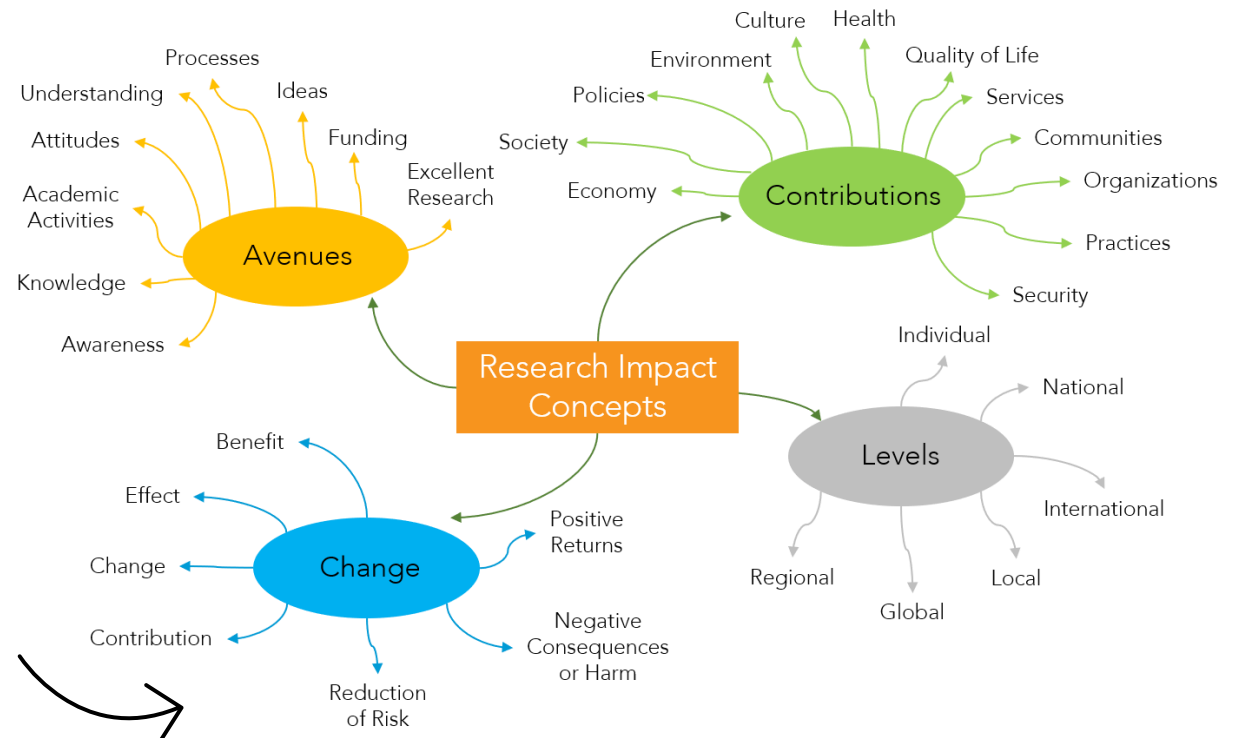
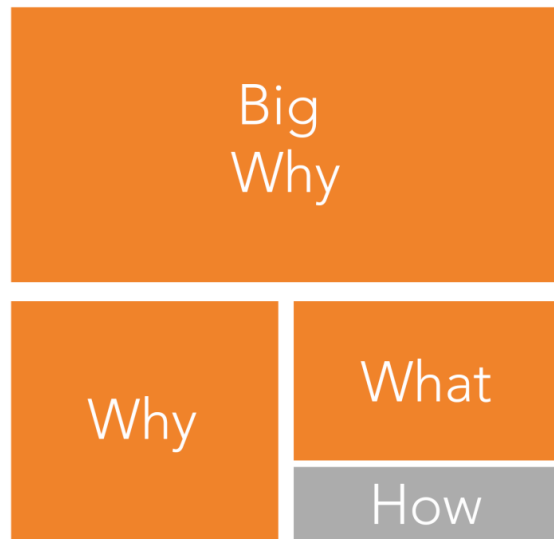
The **thesis statement** contains the main idea that controls the content of the essay.

Subpoints in the thesis or nearby help the reader know how the essay will be organized

Organizing thoughts using Storyboard

The What: Novelty of the Solution

iStory
The Storyboard



- To Whom, Where, Which group you bring change to
- How you make those changes
- What kind of change

Applications

Publication submission and posting at KUDOS



International Journal of Hydrogen Energy

Volume 44, Issue 37, 2 August 2019, Pages 20725–20737



UASFF start-up for biohydrogen and biomethane production from treatment of Palm Oil Mill Effluent

Bidattul Syrat Zainal ^a, Azam Akhbari ^a, Ali Akbar Zinatizadeh ^b, Parviz Mohammadi ^c, Mahmoud Danee ^d, Nurul Syuhadaa Mohd ^a, Shaliza Ibrahim ^{a,*, R}

Show more

<https://doi.org/10.1016/j.ijhydene.2018.07.037>

Get rights and content

Highlights

- A total COD removal efficiency of 83.70% was achieved using raw POME in two-stage UASFF reactor.
- Short-term and stable H₂ and CH₄ production were established in thermophilic UASFF bioreactor.
- Highest H₂ percentage and HPR was 57.11% and 5.29 L d⁻¹ using 100% raw POME.
- Highest CH₄ percentage and MPR was 94.08% and 9.60 L d⁻¹ using 100% raw POME.

Abstract

A start-up study was conducted to produce **biohydrogen** and **biomethane** from Palm Oil Mill Effluent (POME) using a two-stage up-flow anaerobic sludge fixed-film (UASFF) bioreactor. 100% molasses was used to start the system, and POME was added at 10% increments until it reached 100% after 59 days. During this period of continuous operation, the HRT and temperature were adjusted in order to optimize the condition for **biogas production**. Hydrogen and methane gas production fluctuated between 53–70% and 90–95%, respectively, in the last four days of operation (days 56–59), with POME percentage being increased from 70% to 100% (30%–0% molasses). Using 100% raw POME led to a total COD removal of 83.70%, average gas production rates of 5.29 L H₂ d⁻¹ (57.11% H₂) and 9.60 L CH₄ d⁻¹ (94.08% CH₄), in their respective units. This output is comparable to, if not better than using 100% molasses as substrate. This work concludes that based on the relative consistency of biogas production on days 56–59, the two-stage UASFF bioreactor operating at a final HRT of 4 h and temperature of 43 °C has taken a period of two months for start-up.

Space Weather

Research Article | Open Access | © |

The Persistent Ionospheric Responses Over Japan After the Impact of the 2011 Tohoku Earthquake

Min-Yang Chou ^a, Iurii Cherniak, Charles C.H. Lin, N.M. Pedatella

First published: 13 March 2020 | <https://doi.org/10.1029/2019SW002302>

Abstract

In this study, we report the persistent impacts of the 2011 Tohoku earthquake/tsunami on the ionosphere using the ground-based Global Navigation Satellite System and FORMOSAT-3/COSMIC total electron content. Multiple unusual ionospheric phenomena, such as ionospheric irregularities, nighttime medium-scale traveling ionospheric disturbances (MSTIDs), and planar traveling ionospheric disturbances (TIDs), were observed after the emergence of tsunami-induced concentric gravity waves. The ionospheric irregularities initially developed over the Hokkaido region following the interference of gravity waves at ~8:45 UT. Remarkably, the Perkins-type nighttime MSTIDs accompanying the planar TIDs were discernible over Japan following the irregularities. By comparing with the tsunami model simulation and ocean buoy observations, it is determined that these planar TIDs, lasting for about 10 hr, were likely related to tsunami ocean waves reflected by seamounts, ridges, islands, and seafloor topography in the Pacific Ocean. Due to the absence of sporadic E layers, we suggest that the coupling between the tsunami-generated gravity waves and the Perkins instability plays an essential role in initiating the equinoctial nighttime MSTIDs. The long-lasting tsunami can continuously impact the ionosphere, affecting the nighttime ionospheric electrodynamic and making the conditions conducive for the development of midlatitude nighttime ionospheric irregularities and instabilities.

Plain Language Summary

On 11 March 2011, a magnitude 9.0 earthquake occurred near the east coast of Honshu, Japan, unleashing a savage tsunami as well as unprecedented plasma ripples at the space-atmosphere interaction region. Although the earthquake was a transient local event, the tsunami ocean waves backscattered by seafloor topography in the Pacific Ocean continuously excited gravity waves and planar traveling ionospheric disturbances (TIDs) propagating toward Japan for more than 10 hr. Unusual ionospheric band structures referred to the midlatitude nighttime medium-scale TIDs (MSTIDs) and plasma irregularities developed following the planar TIDs over Japan. It is common to observe the nighttime MSTIDs traveling along the Japan island during the summer; however, they are rarely seen in March. What drove the appearance of MSTIDs and ionospheric irregularities in March was likely the reflected tsunami wave-induced gravity waves. Such space weather phenomena have an adverse impact on Global Navigation Satellite System navigation and applications. Therefore, understanding how natural hazards impact our upper atmosphere and cause variations in the space environment around Earth is crucial.

Non-invasive CT thermometry in hyperthermia cancer treatment



Photo by Walter Otto on Unsplash

What is it about?

This study aims to reduce or possibly eliminate the use of contrast medium needed for CT imaging to identify the target region for surgical removal in the organ by using non-invasive CT thermometry. Through the experimentation on bovine liver samples, the association between tissue temperature and CT number counts are observed. Cancer patients, particularly those with liver cancer receiving hyperthermia treatment, are to benefit through this research. Support and more comprehensive data on CT images and tumour conditions are required from physicians/radiologist/radiographer/medical physicist for further investigation and perfecting this research.

Why is it important?

The existing procedure used in the evaluation of unresectable liver tumours relies heavily on visual inspection of contrasted CT image. Though widely practiced, this procedure has shown cases of patients being allergic to the medium, and the process tends to cause patient discomfort. Hence, the development of a CT-tissue temperature conversion model as an alternative tool could provide attending physicians the additional information of the target region as well as expedite patient recovery due to its non-invasive nature. The outcome of this research could potentially alter the current hyperthermia treatment procedures for cancer patients.

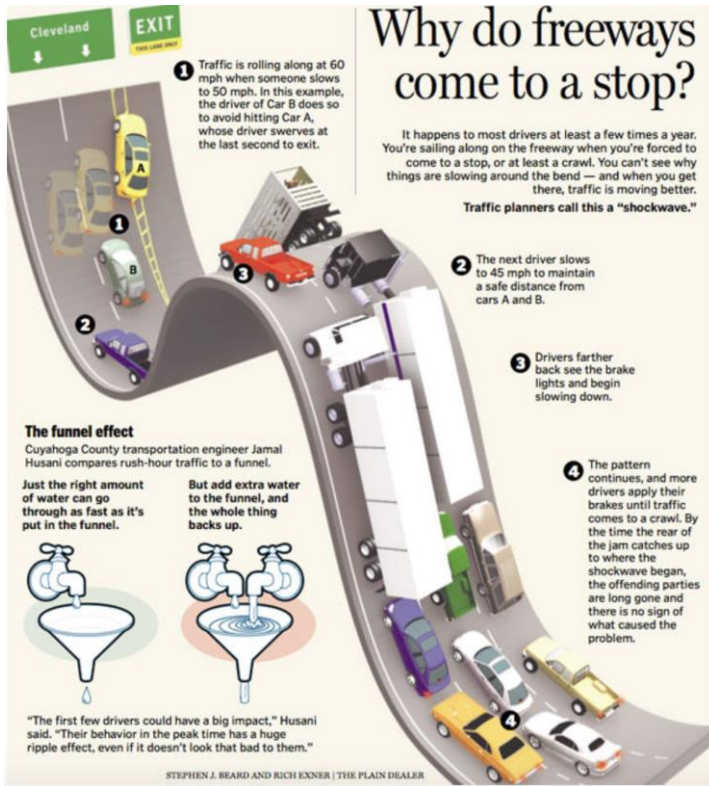
Perspectives

KL Ir Dr KOK SING LIM
University of Malaya

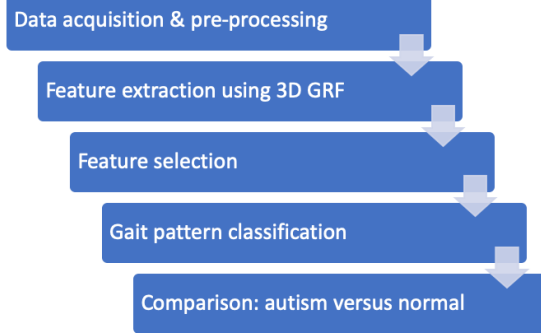
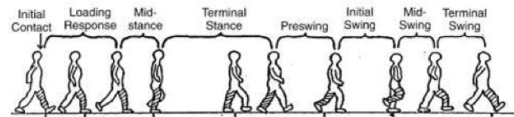
Cancer is the second leading cause of death globally and the fourth most common cause of death in Malaysia. Iodinated contrast used in CT scan has mild side effects including nausea and vomiting, headache, itching, flushing, mild skin rash or hives and can also trigger a life-threatening reaction in a few cases. A new approach is required to improve the diagnosis and to reduce the reliance of drug with side effects for cancer patients as well as improving treatment efficacy. This research will further need to engage with radiologists to acquire more real patient data for analysis and proof of concept and also with CT-scanner manufacturer for collaboration, which may benefit the study and treatment outcome. In compliance with the UN's third Sustainable Development Goal, this study aims to ensure healthy lives and promote well-being for all at all ages through the improvement of existing medical procedures.

Applications

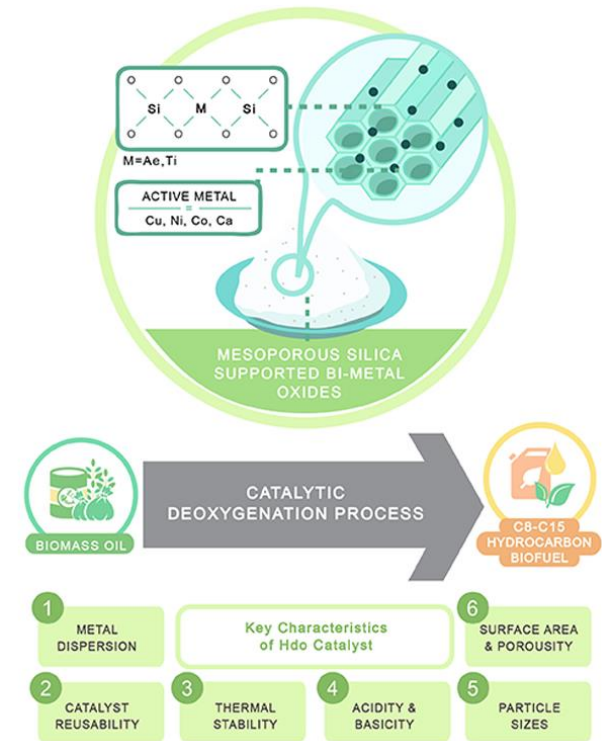
Graphical Abstract and poster design



Quantitative assessment of 3D GRF (ground reaction floor) gait pattern of autism children



Indicators in identifying gait deviations in children with ASD (autism spectrum disorders)



Applications

ieStory

The screenshot displays the ieStory website interface. At the top, there is a navigation bar with links for Home, Our Online Services, Our Resources & Events, About Us, ieStory, and My Account. A search bar is also present. The main content area features a large image of an industrial facility with a prominent storage tank labeled 'ies'. Below the image is the title 'Biohydrogen and Biomethane Production from Palm Oil Wastewater Treatment'. To the right of the image is a profile for Shaliza Ibrahim, a researcher at the University of Malaysia (UM) - Department of Civil Engineering. Below her profile is an 'Original Article Reference' section with a 'Click to original' button. The page also includes a 'Plain Language Summary' section with icons for various SDG goals (6, 7, 9, 13) and a 'Graphical Abstract' section with a diagram of the production process. At the bottom, there is a 'Related Articles' section with two article thumbnails: 'Ballistic Performance of Basalt Fiber Laminated Composites' and 'Potential GHG Emissions Reduction via Integrated Waste Management System'.

25 total views

Biohydrogen and Biomethane Production from Palm Oil Wastewater Treatment

Shaliza Ibrahim
University of Malaysia (UM) - Department of Civil Engineering

Original Article Reference
This highlight is a summary of the paper 'UASFF start-up for biohydrogen and biomethane production from treatment of Palm Oil Mill Effluent' from the International Journal of Hydrogen Energy, August 2019, Elsevier.
DOI: 10.1016/j.ijhydene.2018.07.037
Research Footprints:
Biohydrogen; Biomethane; Palm Oil Mill Effluent; UASFF

[Click to original](#)

Plain Language Summary

The Novelty
This is a start-up study examining the behaviour and performance of palm oil mill effluent in the production of biohydrogen and biomethane gases. Factors such as process stability and biogas production are considered in the conversion of palm oil discharge using a two-stage up-flow anaerobic sludge fixed film (UASFF) bioreactor. In addition to the conventional methane production, this research provides an efficient method of palm oil wastewater treatment with a higher value output of hydrogen gas production. With the support of industries and government, this research could serve as a golden standard in palm oil waste treatment as well as be implemented as part of a sustainable approach in various industrial organic waste management system.

The Background
The rapidly diminishing energy source has imposed a growing demand on resource conservation and green energy production initiatives. Apart from utilizing methane as an organic byproduct to generate energy, hydrogen gas production via industrial wastewater treatment promises a cleaner energy source. The outcome of this research could be used as a technical basis for the development of larger scale prototype design of UASFF to produce biohydrogen and biomethane gases from palm oil discharge treatment.

The SDG Impact
Anaerobic treatment is a well-established technology for treatment of waste and wastewaters as it is technologically simple with a low energy consumption workflow. Moreover, it is an efficient, economic and environmental friendly method. The final product of anaerobic digestion is biogas, a mixture of methane and hydrogen, which could potentially be leveraged in the form of renewable energy source. In compliance to the UN's Sustainable Development Goals, this research aims to fulfil the following:
Goal 6: Ensure availability and sustainable management of water and sanitation for all
Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

[Click to original](#)

Graphical Abstract

[Click to enlarge](#)

Related Articles

- Ballistic Performance of Basalt Fiber Laminated Composites
- Potential GHG Emissions Reduction via Integrated Waste Management System

Research suggest that creating a plain language summary and sharing it actively leads to 23% increase in full-text downloads

Source: Erdt, M., Aung, H. H., Aw, A. S., Rappale, C., & Theng, Y. L. (2017). Analysing researchers' outreach efforts and the association with publication metrics: A case study of Kudos. *Plos One*, 12(8), e0183217-e0183217.

How to Start

Using storyboard

iStory

The Storyboard

Big
Why

Why

What

How

1. READ structurally using the storyboard
2. Develop your own storyboard
3. Manipulate each portion for different purpose



Thank You

Q&A Session

Speaker: Iris Hsu, Research Impact Consultant ies Research

Website: <https://iesresearch.solutions>

Email Address: iesresearch.solutions@gmail.com