



THE USC WRITING CENTER PRESENTS...

THE NOVELTY MOVES:

**Explaining the Originality of Your Research in
the Academy, on the Job Market, and Beyond**

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This workshop for graduate students presents four rhetorical “moves” that communicate why and how your work is an essential contribution to your field. These well-established moves can help you structure a job letter, a dissertation introduction, a conference presentation, or a literature review of journal articles and papers. While the method is applicable to graduate students in any discipline, these moves will be particularly helpful to students in STEM fields.

We need to be able to articulate the relevance of our work



Appealing to diverse audiences



Applying for funding



Promoting ourselves and our work

A. The long-term goal of this project is to analyze neural signals collected from the human brain and use these signals to build a brain computer interface (BCI). BCI aims to provide a direct control pathway from the brain to external devices such as a computer. It is a radically new communication option for those with neuromuscular impairments that prevent them from using conventional augmentative communication methods. In this project, I will develop an application programming interface (API) to extract electroencephalography (EEG) signals collected by a commercial headset.

B. Neural disorders can disrupt the brain's neuromuscular channels making communication impossible for those affected. One radically new communication option for those with neuromuscular impairments is the brain computer interface (BCI). BCI aims to provide a direct control pathway from electroencephalography (EEG) signals in the brain to external devices such as a computer. Currently no programming tools exist to aid researchers in encoding and interpreting commands embedded in EEG signals. Thus, the goal of this project is to develop an application programming interface (API) for translating EEG signals into specific commands that can assist researchers in developing BCIs.

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Why is B easier to understand?

Workshop Overview

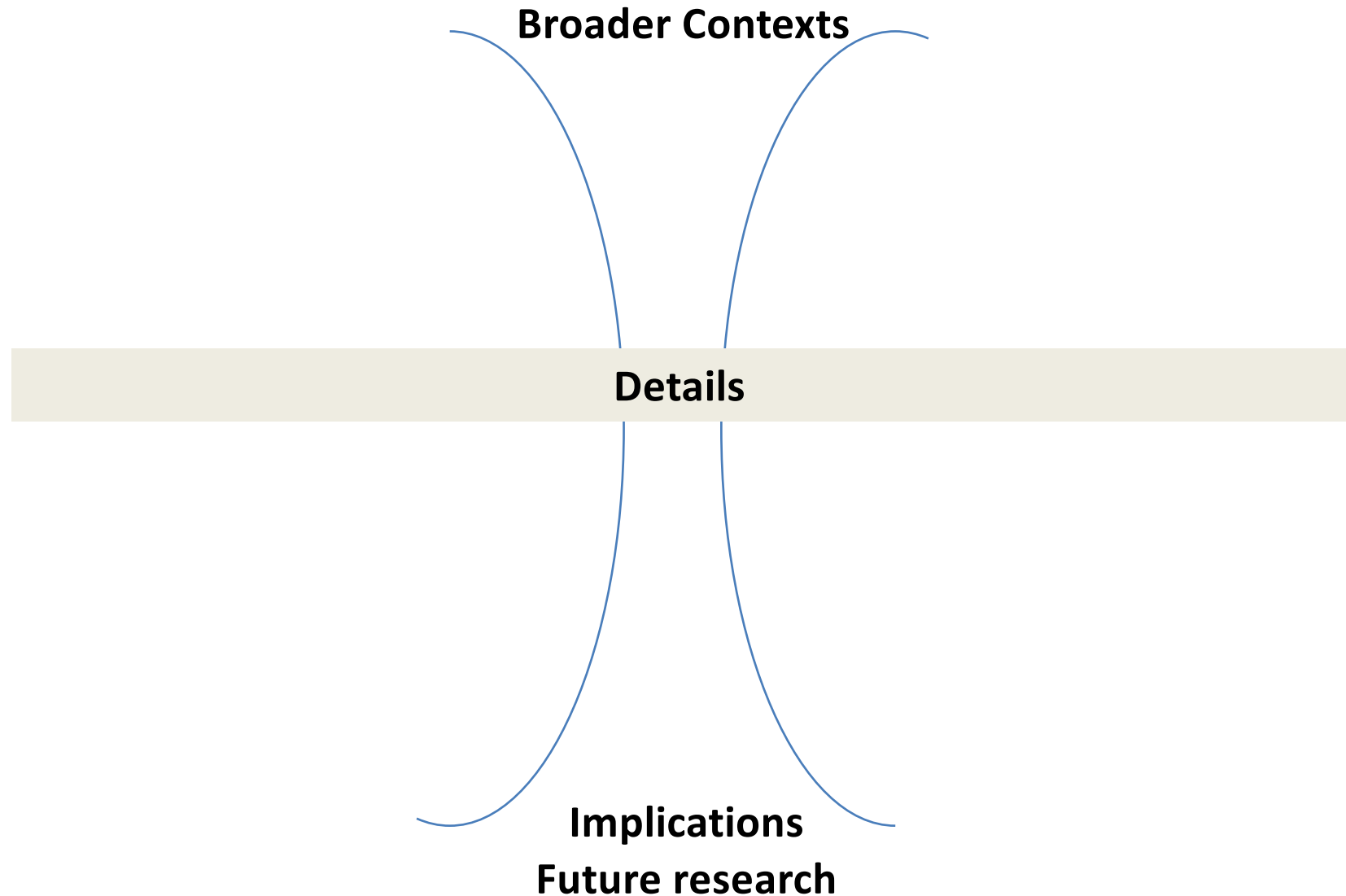
1. Introducing the 4 “Novelty Moves”
2. Identifying the Novelty Moves
3. Adapting the Novelty Moves
4. Applying the Novelty Moves

I. Introducing the 4 “Novelty Moves”

There are three basic types of research

Experimental	Problem/Solution	Theory-Building
<ul style="list-style-type: none">• What is the exact mechanism causing the fishhook effect for particle separation?• What happens to particles sent through an inhomogeneous magnetic field?• What risk do hurricanes present to offshore wind farms?• Do men and women use metaphors differently in speech?	<ul style="list-style-type: none">• Can we improve fault analysis in reactors with support vector machines?• Can the GAB model be improved by adding a fourth constant?• Can we develop sodium-ion batteries to provide a cost-effective means for long-term energy storage?	<ul style="list-style-type: none">• How can we better understand the role of nostalgia in forging immigrant identities?• How are 19th C discourses of sexuality and animality related?• Can we develop a framework for understanding creativity that can help us develop UI tools to support creative processes?

All three types move from BROAD to narrow back to BROAD




Research in most fields tells a similar research story

There's a compelling need for more research on this!



So, here's what we did



And here's what we found



And here's what it means

Introductions need to tell a particularly compelling story

There's a compelling need for more research on this!



So, here's what we did



And here's what we found



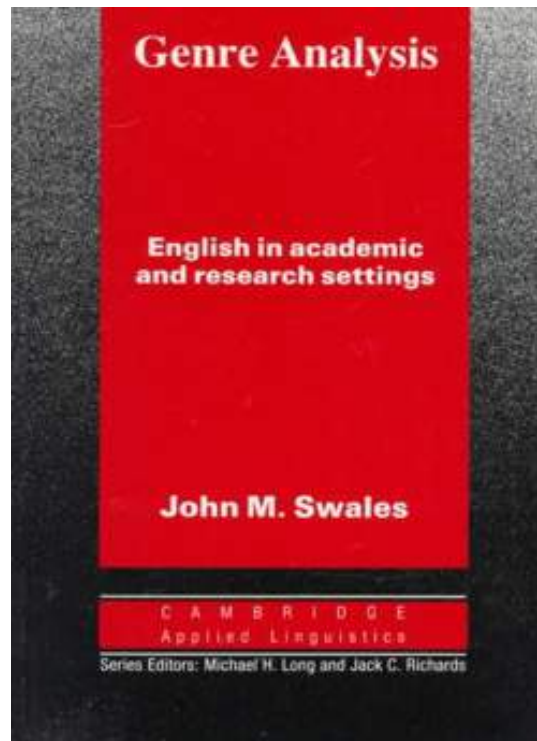
And here's what it means

Unfortunately, the introduction is often the hardest—yet most critical—part of the project to write



Because we often struggle to situate our research within its broader contexts

Fortunately, linguists have analyzed the introductions of published articles and revealed consistent patterns or “moves”



We call these moves the “Novelty Moves”

1. Explain the Significance

*Why should a wider audience care?
How are people being affected?
What’s the real world context?*

2. Describe the Status Quo

*What is currently known?
What are people doing to
address the issue?*

3. Identify a “Gap”

*What is the problem?
What is missing or unknown?
What is the flaw?*

4. Fill the Gap

*How does my work solve the problem?
How does my work address the issue in
a new way?
How does my work extend or develop
current knowledge?*

Neural disorders can **disrupt** the brain's neuromuscular channels making communication **impossible** for those affected.

Significance

One **radically new** communication option for those with neuromuscular impairments is the brain computer interface (BCI). BCI **aims to provide** a direct control pathway from electroencephalography (EEG) signals in the brain to external devices such as a computer.

Status Quo

However, currently no programming tools exist to aid researchers in encoding and interpreting commands embedded in EEG signals.

Gap

Thus, the **goal of this project is to develop** an application programming interface (API) for translating EEG signals into specific commands that can assist researchers in developing brain computer interfaces.

Fill the Gap

What does it mean, and what does it take, to keep a work identity alive? **Scholars have investigated** identity work in organizational contexts characterized by strong cultures, tight communities, and strict display rules, showing how people strive to fit into demanding roles without losing their individuality. Economic volatility and technological change, **however**, have led more people to work outside such strong contexts as independent workers loosely connected to organizations or selling directly to the market. For these workers, **the availability** of institutionalized frameworks to orient their identity work is, **at best, elusive**. **Thus, we conducted** a qualitative study of independent workers who were facing chronic uncertainty about the stability and meaning of their work identities.

Significance

Status Quo

Gap

Fill the Gap

2. Identifying the “Novelty Moves”

Unscramble this introduction

A	Thus, to increase the sparkles available for unicorn consumption, this paper presents a model for developing hydroponic sparkle gardens from which sparkles can be harvested and used to maintain the flying capabilities of the unicorns we've come to rely on.
B	Researchers have recently discovered that this flying ability depends on unicorns' access to sparkles, which are a naturally occurring within enchanted forests.
C	Unicorns' ability to fly provides humans with the previously unknown joy of visiting mountaintops, cloudscares, and the ends of rainbows.
D	However, because enchanted forests (and consequently sparkles) are becoming scarce due to changes in the global climate, unicorns are in increasingly in danger of losing their ability to fly.

A “correct” order:

C
B
D
A

Unscramble this introduction

A

How organisms learn the value of single stimuli through experience is well described. In many decisions, however, value estimates are computed “on the fly” by combining multiple stimulus attributes.

B

Here we explore a common scenario in which decision-makers must combine information about quality and quantity to determine the best option.

C

Many choices we make each day require us to weigh up the quality and quantity of different outcomes.

D

The neural basis of this computation is poorly understood.

(Adapted from: Berker A.O, et al. Computing Value from Quality and Quantity in Human Decision-Making. *Journal of Neuroscience* 2 January 2019, 39 (1) 163-176).

A “correct” order:

C
A
D
B

Can you identify each of the
Novelty Moves in “Example 3”
on the handout?

Although plastic has **revolutionized** modern life, traditional petroleum plastics have a **staggering impact** on the environmental. Bioplastics, an alternative to petroleum plastics, may be a more sustainable option because they use fewer fossil fuels in production and reduce greenhouse gas emissions as they biodegrade. One particularly promising bioplastic is polylactic acid (PLA), which resembles traditional plastic and can be processed on equipment already used for petroleum plastics. **However**, the commercial viability of PLA is **currently limited** because it can only be composted in industrial facilities and cannot be mixed with other recyclable materials [1, 2]. To make PLA more commercially viable, we develop a device that composts PLA and other bioplastics within a home composting environment [3]. Such a device, we argue, encourages the production of more sustainable and economic bioplastics.

Significance

Status Quo

Gap

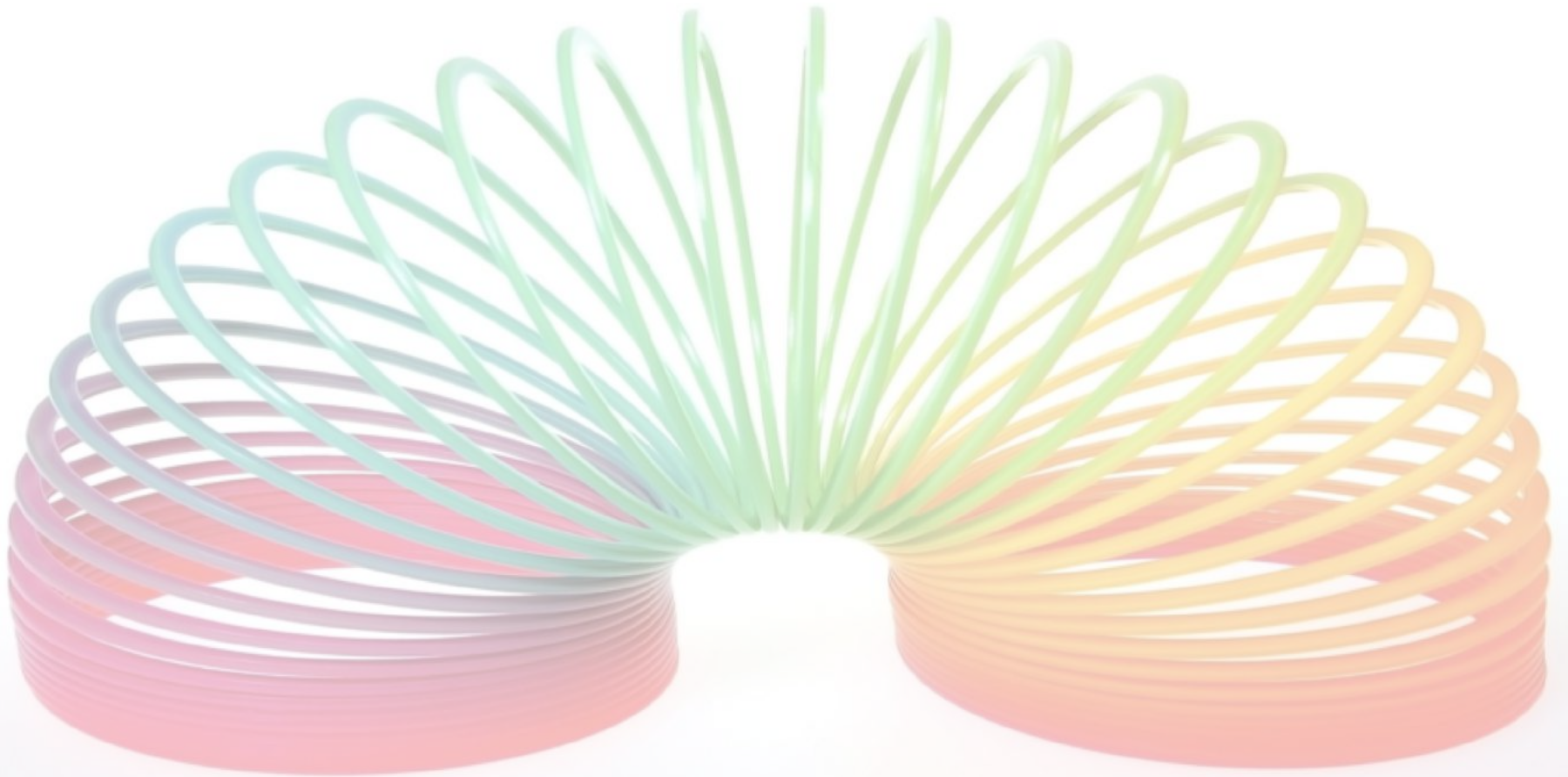
Fill the Gap

4. Adapting the Novelty Moves

The flexibility of the Novelty Moves makes them widely applicable



I. Flexible in arrangement



A. Combining the Moves

Major depressive disorder (MDD) is a **common and debilitating condition** that **contributes significantly to global disease burden.**

Significance

Anhedonia is a core symptom of depression, **but** the underlying neurobiological mechanisms are **unknown**. Correlative neuroimaging **studies implicate** dysfunction within ventromedial prefrontal cortex, **but** the causal roles of specific subregions remain **unidentified**. **We**

Status Quo + Gap

addressed these issues by combining intracerebral microinfusions with cardiovascular and behavioral monitoring in marmoset monkeys to show that over-activation of primate subgenual anterior cingulate cortex (sgACC, area 25) blunts appetitive anticipatory, but not consummatory, arousal, whereas manipulations of adjacent perigenual ACC (pgACC, area 32) have no effect.

Fill the Gap

B. Rearranging the Moves

The literature on undergraduate women in engineering is rife with situations in which women face major problems in team projects and other interactions outside of class **but have no good strategies for resolving these problems.**

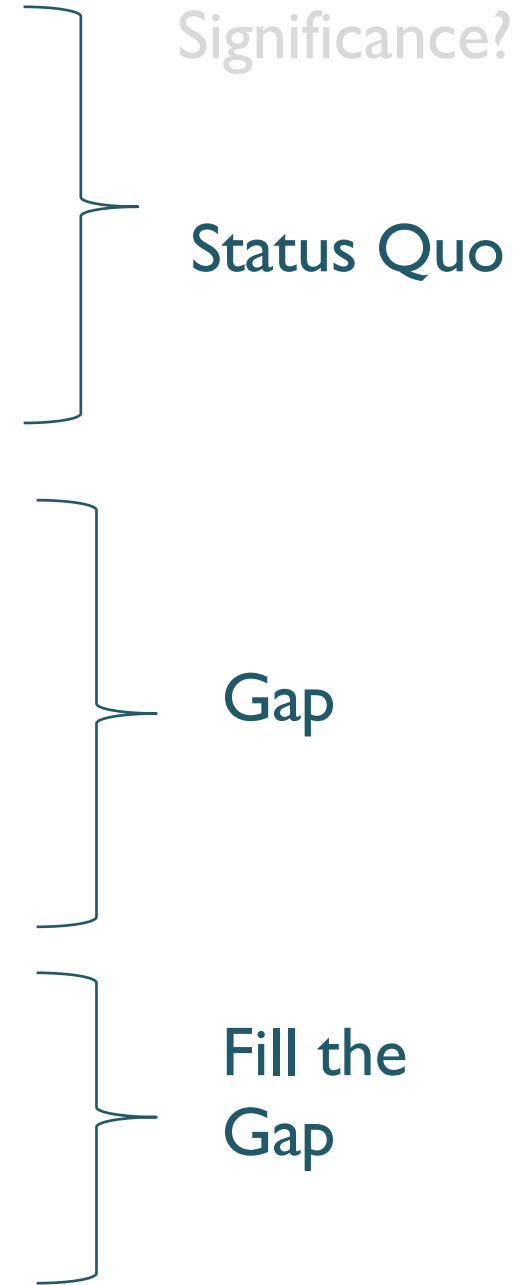
Status Quo and Create a Gap

This project is based upon the theory that women who have been successful in engineering schools and workplaces have developed tacit knowledge (assumptions, habits, and strategies that individuals know but usually cannot articulate explicitly) about how to interact successfully in this environment. The goal of this project is to tap into this tacit knowledge and bring it to the surface where it can **serve as a resource for young women and girls** just entering engineering and similar male-dominated fields.

Fill the Gap and Significance

C. Omitting a Move (with caution)

Theories of public policy change, despite their differences, converge on one point of strong agreement: the relationship between policy and its causes can and does change over time. This consensus yields numerous empirical implications, but our standard analytical tools are inadequate for testing them. As a result, the dynamic and transformative relationships predicted by policy theories have been left largely unexplored in time series analysis of public policy. This article introduces dynamic linear modelling (DLM) as a useful statistical tool for exploring time-varying relationships in public policy.



Laws restricting the behaviors of homeless people in public places are proliferating.

Proponents argue that such “quality of life” laws will encourage homeless people to move off the streets and into services, and thereby improve their quality of life. Critics argue that these laws target vulnerable individuals and show little evidence of improving the lives of homeless people. To inform this debate, this article reports data from two separate surveys of Colorado homeless residents regarding their experiences with quality of life policing, supplemented by a review of police data regarding contacts, ticketing, and arrests of homeless people

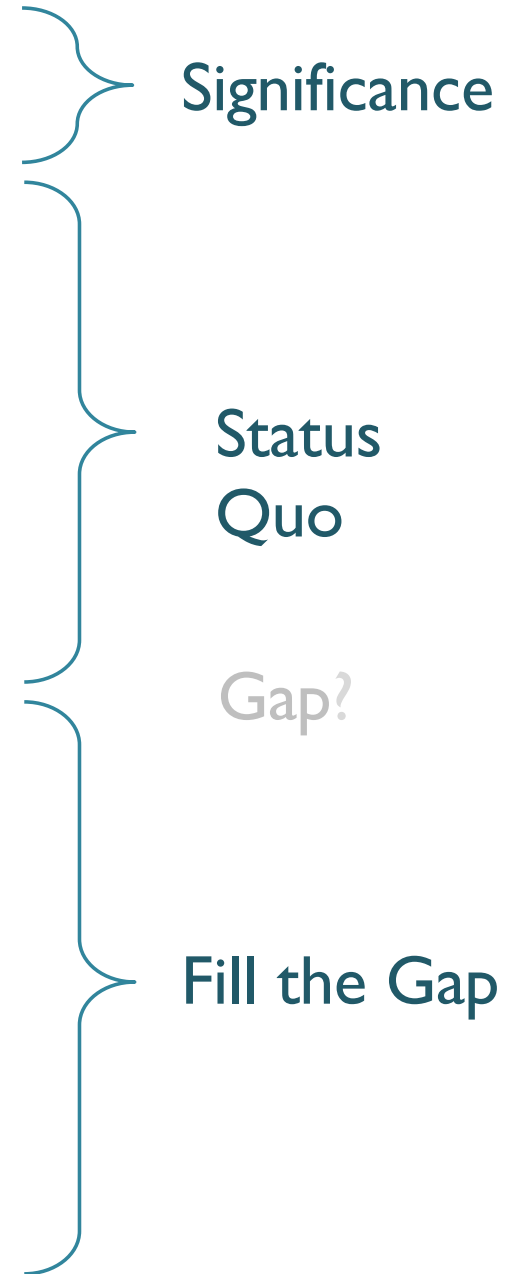
Significance

Status Quo

Gap?

Fill the Gap

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D. Adding to the Moves

The “big gap, little gap” arrangement is a common variation when research is very specific

Research on the British colonial state has been thriving and scholars have been assiduous in suggesting theories of its nature and its relationship to the legal and political structures of Western imperial modernity.² However, historians have generally have limited their inquiries to the “fiscal-military state,” as John Brewer famously dubbed it. Scholars generally agree that this imperial state helped forge some of the unique capacities of modern statehood and contributed to British domination in the eighteenth century war for trade and empire. What remains striking is that the cultural intimations and practices of state-building, tend to escape sustained attention. This project helps revivify a cultural perspective on the arts and strategies of colonial state-making in the eighteenth century by examining the practices of governance in three frontiers of the British empire—Fort Marlborough (Sumatra), St. Helena, and Jamaica.

Status
Quo 1

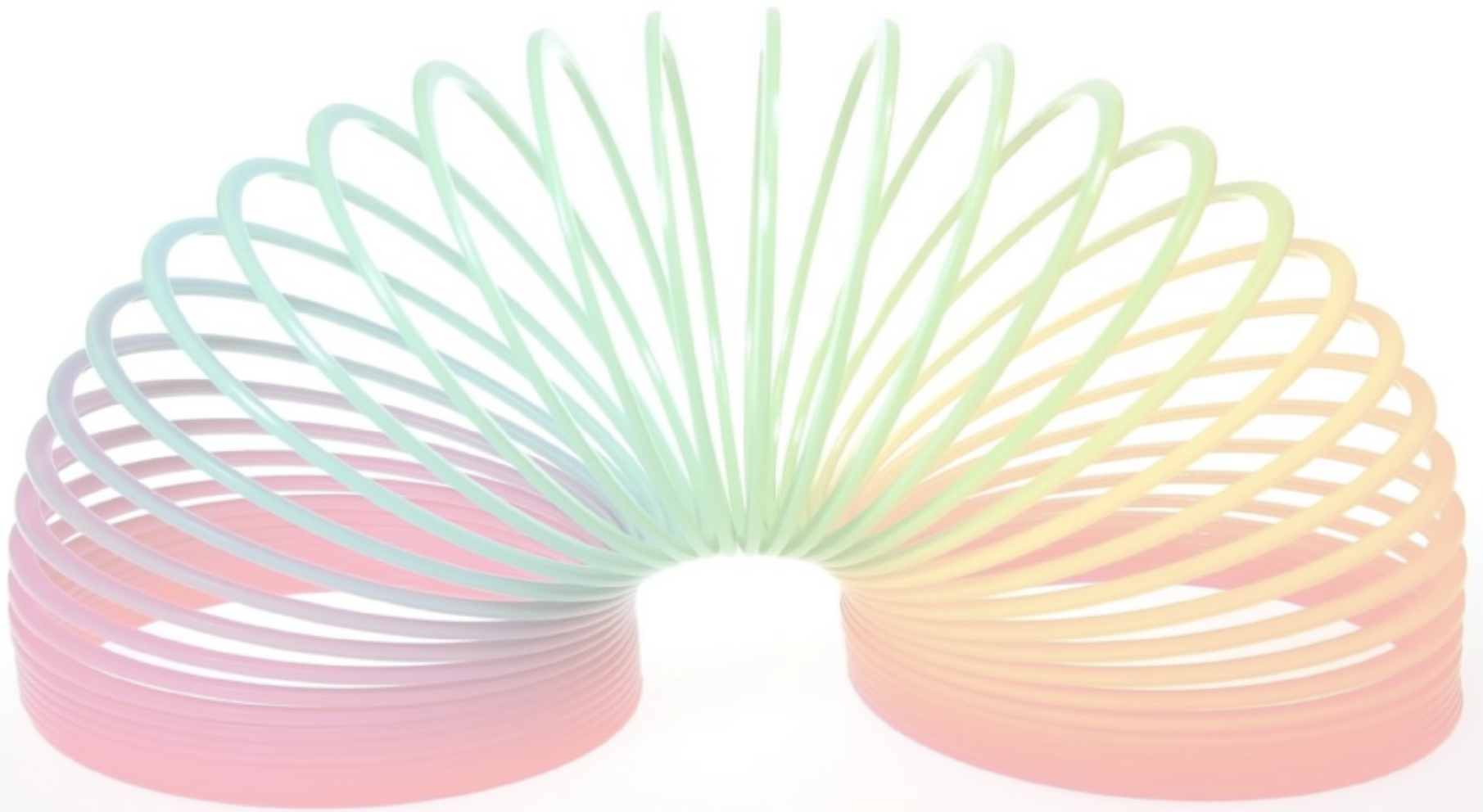
Gap 1
(Big)

Status
Quo 1

Gap 2
(Little)

Fill the
Gap(s)

2. Flexible in length



The moves can be **contracted** to fit within your abstract

Carbon Nanotube-TiO₂ Photocatalysts: Cylindrical Structure and Efficiency

ABSTRACT

Developing carbon nanotube-TiO₂ hybrids toward highly efficient photocatalyst under visible light has been attracting growing attention. Since TiO₂ is an abundant material with appropriate potential to split water and chemical inertness, current studies look to the material as one of the promising photocatalysts. However, there are several limitations such as large bandgap energy (3.2 eV) deteriorating its effective light response ranges and fast electron-hole recombination rate. In this thesis, we used a technique to dissect carbon nanotube-TiO₂ hybrids, which we divided into two parts – one is on nano-photochemical cells of TiO₂/carbon nanotube (CNT)/Pt with spatially separated oxidation and reduction channels and the other is on TiO₂/single walled carbon nanotubes (SWCNT) aerogels with high surface area and stable. We find that as a **photocatalyst**, TiO₂ would be located outside of a carbon nanotube that acts as a photosensitizer and separator for TiO₂, and platinum co-catalyst particles would be located inside of the carbon nanotube. Carbon nanotubes should spatially separate the reduction and oxidation parts of water splitting so that higher yield of products from water can be obtained. Since the carbon nanotubes synthesized by using AAO templates are multi-walled nanotubes (MWCNTs) with a big diameter, highly purified SWCNTs are used for TiO₂-hybrids to maximize the properties of carbon nanotubes. These results have a large significance for solving the recent shortage of fossil fuels and environmental pollution.

INTRODUCTION

One of the most pivotal issues today is the shortage of fossil fuels and environmental pollution resulting from usage of the fossil fuels. Thus, developments in alternative renewable energy are necessary. Among various energy sources, hydrogen energy is an ideal fuel to solve the issues since it can be generated from water and also produces water as a byproduct. To produce hydrogen from water, photocatalytic water splitting is an outstanding method since it needs solar energy and water that are abundant, renewable, and innocuous [1-4]. Hence, it is important to design a photocatalyst that can generate hydrogen from water efficiently. Moreover, in order to commercialize the photocatalytic water splitting, usage of abundant materials and a development in a simple system is necessary to reduce cost. Among various available photocatalysts, Titania (TiO₂) is a promising material due to its appropriate potential to split water, chemical inertness, cost effectiveness, and stability against photo-corrosion. However, Titania has several limitations such as a large bandgap energy (3.2 eV) deteriorating its effective light response range [5, 6], fast electron-hole recombination rate and low surface energy [6, 7]. To solve these problems, synthesis of a hybrid photocatalyst with carbon materials such as carbon nanotubes or graphene is getting more attention [8]. Another problem of using a single-phase photocatalyst is that it is hard to separate the products of water splitting because there is no separation between the reduction and oxidation sites. The problem not only accelerates

50 words - novelty moves
(within a 250-word abstract)

Abstract

Despite the **exponentially rising amount** of radio transmitters, **currently no** transmitter identification techniques **exist** that can handle **the common transmitting problems of** conflicting signals and poor DTV reception. To mitigate this problem, **we propose a TxID** technique that can identify multiple transmitters and weak interference sources, independent of the DTV reception. We explain the development of this technique and establish the new Hessian analysis to derive the constraint of the injection level. Our novel robust least- square TxID scheme is found to greatly outperform the conventional cross-correlation based approach. Through Monte Carlo simulations, the fingerprinting technique is demonstrated to be very robust when reducing multipath distortion generated by neighboring transmitters in an SFN. Such a technique would enable broadcast authorities and operators to identify the source of in-band interference in some coverage overlapped areas.
(130 words)

Status Quo +
Gap

Fill the Gap

Method

Results

Discussion

The length of these “moves” will depend on where you’re using them

250 word
novelty
moves – as
the first
paragraph
of an
introduction

INTRODUCTION

One of the most pivotal issues today is the shortage of fossil fuels and environmental pollution resulting from usage of the fossil fuels. Thus, developments in alternative renewable energy are necessary. Among various energy sources, hydrogen energy is an ideal fuel to solve the issues since it can be generated from water and also produces water as a byproduct. To produce hydrogen from water, photocatalytic water splitting is an outstanding method since it needs solar energy and water that are abundant, renewable, and innocuous [1-4]. Hence, it is important to design a photocatalyst that can generate hydrogen from water efficiently. Moreover, in order to commercialize the photocatalytic water splitting, usage of abundant materials and a development in a simple system is necessary to reduce cost.

Among various available photocatalysts, Titanium (TiO₂) is a promising material due to its appropriate potential to split water, chemical inertness, cost effectiveness, and stability against photo-corrosion. However, Titanium has several limitations such as a large bandgap energy (3.2 eV) deteriorating its effective light response range [5, 6], fast electron-hole recombination rate and low surface energy [6, 7]. To solve these problems, synthesis of a hybrid photocatalyst with carbon materials such as carbon nanotubes or graphene is getting more attention [8]. Another problem of using a single-phase photocatalyst is that it is hard to separate the products of water splitting because there is no separation between the reduction and oxidation sites. The problem not only accelerates recombination of generated charges and products but also backward reaction of products. As a solution to the problem, the photoelectrochemical cell composed of a semiconductor as a working electrode connected through an external circuit to a counter electrode has been developed [8]. However, efficiency of the photoelectrochemical cells is still low and more effective materials design is necessary.

Here, we developed a new photoelectrochemical cell composed of an abundant photocatalyst which can react under visible light region and micro-channels for separation of the products. As a photocatalyst, TiO₂ would be located outside of a carbon nanotube that acts as a photosensitizer and separator for TiO₂, and platinum co-catalyst particles would be located inside of the carbon nanotube. Carbon nanotubes should spatially separate the reduction and oxidation parts of water splitting so that higher yield of products from water can be obtained. To realize the structures, anodic aluminum oxide (AAO) was used as a template. The AAO template is one of the widely used ways to synthesize nanotube structures with a uniform diameter and various materials. By using the template, TiO₂ and carbon nanotube co-axial structures with Pt nanoparticles located on the inside of the tubes would be realized.

The other approach to enhance photocatalytic activity of TiO₂ is using single walled carbon nanotubes (SWCNTs). Compared with MWCNTs, SWCNTs have higher surface area and higher conductivity, which can result in enhancement of photocatalytic activity by combining TiO₂. However, SWCNTs are hardly used to photocatalysts because it is hard to disperse individual

SWCNT without any damages of their properties although the properties of SWCNTs are better than MWCNTs. In addition, since the diameter of a SWCNT is about 1 nm, if the size of TiO₂ particles are dozens nm, it would be hard to load the particles on 1 nm SWCNT. Thus it is also required to make small size of TiO₂ particles to be deposited on a SWCNT.

To overcome the challenges mentioned above, SWCNT aerogels are used for the photocatalysts. SWCNT aerogels are composed of an individual SWCNT in highly porous networks by maintaining their outstanding properties. By using the SWCNT aerogels to TiO₂ hybrids, enhanced photocatalytic activity can be expected because a large surface area makes a large reactive sites and a high conductivity can promote effective charge transfer at the SWCNTs-TiO₂ hetero-junction. Moreover, TiO₂ particles can be synthesized with a small size enough to be loaded on SWCNT when the particles are confined in the SWCNT aerogel networks. In this work, we first realized deposition of TiO₂ nanoparticles on well-dispersed SWCNTs to use maximum properties of an individual SWCNT for TiO₂-hybrids. By depositing TiO₂ on SWCNT aerogels, we were able to successfully incorporate TiO₂ nanoparticles on well-dispersed SWCNTs and demonstrate enhanced photocatalytic activity with stable network in water.

The first work is on the photochemical cells of Titanium/Carbon nanotube/Platinum which was first developed by locating TiO₂ outside of a carbon nanotube and locating Pt nanoparticles inside of the carbon nanotube to separate the oxidation and reduction part spatially. The photocatalytic activity of TCP-simultaneous was significantly enhanced investigated by photocatalytic degradation of methylene blue under visible light. The results is attributed to fast charge separation by reducing recombination of e-h pairs and extended light response to the visible region. The separated oxidation and reduction sites are verified by photo-deposition of MnO₂ outside of TCP and Ag nanoparticles deposited inside of TCP. By this experiment, it is proven that outside of the TCP nanotubes is oxidation site and inside of the TCP nanotubes is reduction site. In addition, photo-degradation of methylene blue of TCP with AAO templates shows almost perfect separation of the oxidation and reduction sites with negligible pinholes between TiO₂ and carbon nanotubes. Even if some of light can penetrate to TiO₂ and some e-h pairs are photo-generated, holes in the TiO₂ cannot migrate anywhere since every spot is blocked by AAO template while electrons try to transfer through a CNT, which make reaction stopped. The photoelectrochemical performance of TCP-simultaneous shows high photocurrent below 1.23 V versus reversible hydrogen electrode (RHE) under both white and visible light. Even though pristine TiO₂ don't have any activity under visible light, the applied bias photon-to-current efficiency (ABPE) of TCP-simultaneous represents 1.45 % efficiency under white light and 0.6 % under visible light at 0.8 V versus RHE.

In the second work, TiO₂/SWCNT aerogels are developed with high surface area, fast charge separation, and stable network. The microscopic images show uniform networks of the aerogels in a long-range order and TiO₂ nanoparticles with 9.3 nm of average particle size. TiO₂/SWCNT aerogels shows a high specific surface area and porosity investigated by nitrogen isotherms.

The moves can be expanded to several paragraphs (or pages) in your introduction

INTRODUCTION

One of the most pivotal issues today is the shortage of fossil fuels and environmental pollution resulting from usage of the fossil fuels. Thus, developments in alternative renewable energy are necessary. Among various energy sources, hydrogen energy is an ideal fuel to solve the issues since it can be generated from water and also produces water as a byproduct. To produce hydrogen from water, photocatalytic water splitting is an outstanding method since it needs solar energy and water that are abundant, renewable, and innocuous [1-4]. Hence, it is important to design a photocatalyst that can generate hydrogen from water efficiently. Moreover, in order to commercialize the photocatalytic water splitting, usage of abundant materials and a development in a simple system is necessary to reduce cost.

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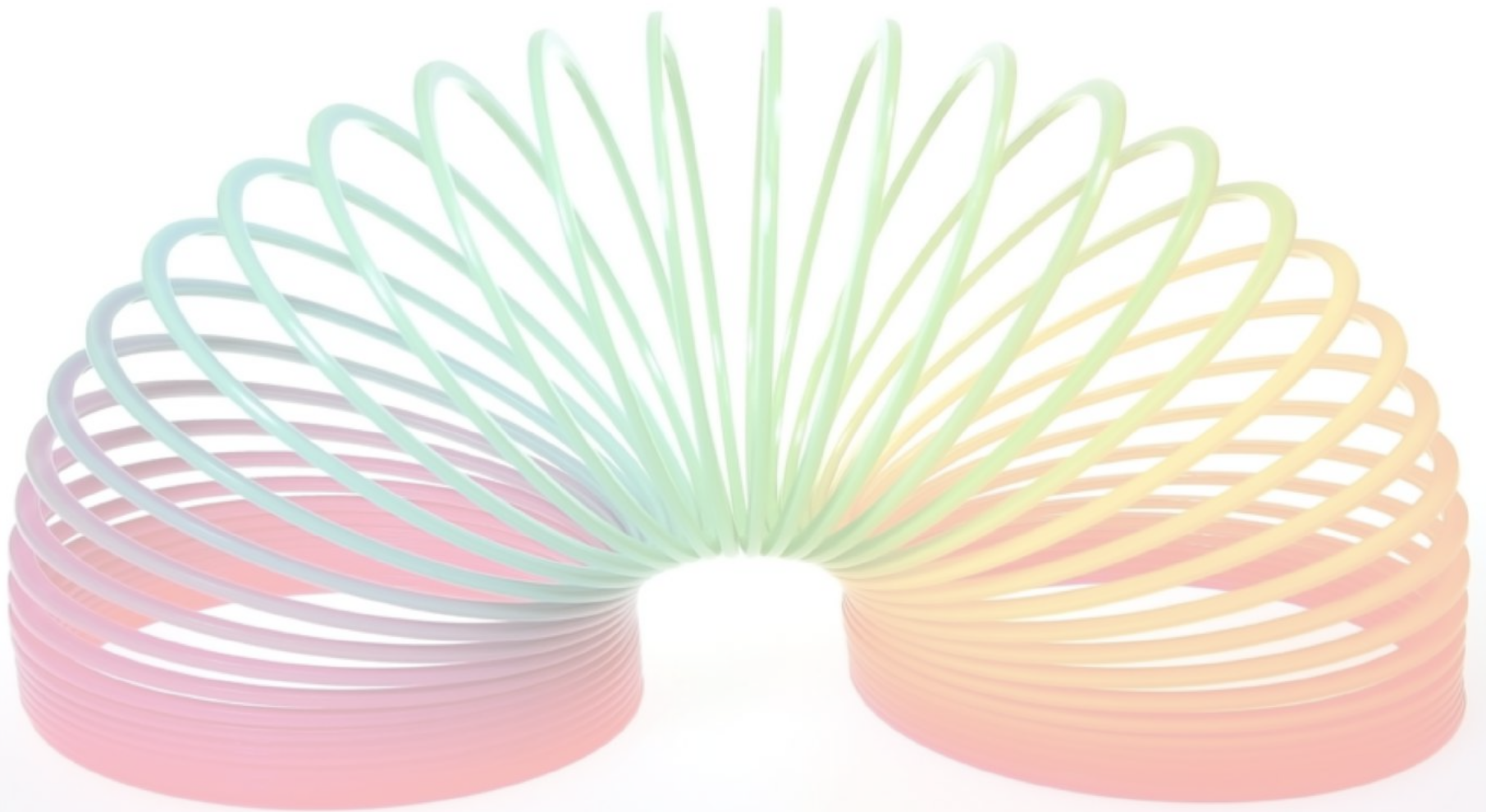
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500-word
novelty
moves
(within an
intro)

3. Adaptable to situations and genres



5. Practice with your own research

Your turn: apply the novelty moves to your current work or a recent project

1. For the next few minutes, brainstorm about how these moves apply to your work
(approx. one sentence per move – write them down!)

2. In pairs, try your “blurb” out.
Partner: listen to and critique blurb, offering insight into:
 - a) what was clear
 - b) what was confusing
 - c) is it compelling?

Academic Phrases for the Novelty Moves



Significance	Status Quo	Gap	Fill Gap
-X project is important because...	-Prior research has shown that...	-However, the commercial viability of X is currently limited because...	-This paper describes a new solution for...
-This work investigates modern concerns with...	-The most-used method for investigating this problem is...	-Although X practice has been used widely, it inadequately addresses...	-We offer a novel approach to...
-X significantly impacts...	-Previous studies have evaluated...	-Whereas research has shown X, it has largely overlooked Y...	-The goal of this paper is to explore a new theory about...
-Due to an ever-increasing number of...	-X process has been described as...	-While current findings are promising, more research is needed because...	-Here, we investigate the previously unstudied X...
-To understand X, it is crucial to...	-Recent work in X has questioned whether...	-While X's work has pioneered the field of Y, it has also raised new questions that need to be explored, such as...	-Unlike existing approaches to X, our approach emphasizes...
-X is especially useful in...	-Ongoing studies indicate that...		-We will suggest ways to address shortcomings in current approaches to X....
-X has become an urgent issue in...	-New models of X suggest that...		

Questions?