

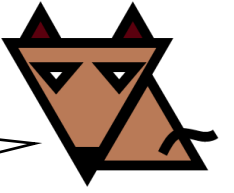
# Science Research Writing For Non-Native Speakers of English

by Hilary Glasman-Deal

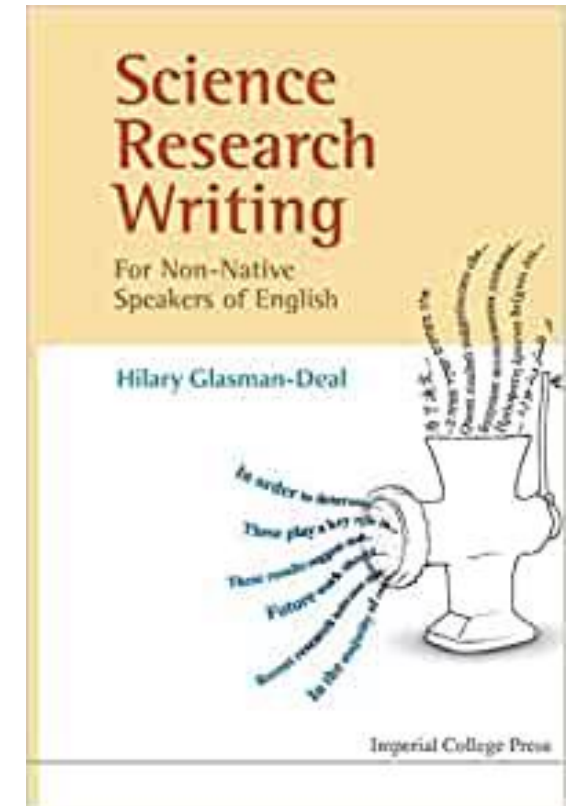
第2章 「Unit 2 Writing about Methodology」 の紹介資料

# この本について

前回のおさらい

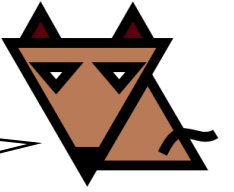


- 分かりやすい科学論文を書くためのマニュアル本
- 査読通過のためのノウハウ本ではない



# この本を選んだきっかけ

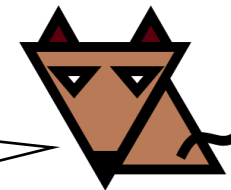
前回のおさらい



- アメリカの大学は留学生がいっぱい（たぶんイギリスも）
  - Non-nativeが英語論文を書くためのサポートがしっかりしている
- 著者：Hilary Glasman-Deal
  - 30年の理系学生へのWriting指導経験
  - 15年間: English Language Support Programme at Imperial College, London
  - **科学論文を書く留学生**を指導
- Amazonで第1章の途中まで立ち読み可
  - 今回その範囲までを紹介（私は立ち読みの末、購入）

# Science Writingは簡単だ

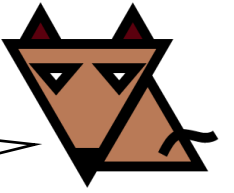
前回のおさらい



- Science Writingは思ったより簡単だ
  - そんなに難しい英語を使う必要はない
  - **マニュアルに従えば書ける**
- ほとんどの科学論文はConventionalな構成
  - Abstract
  - Introduction
  - Central section (what was done what was found)
  - Discussion and/or Conclusion
  - Acknowledgements / Reference
- 専門用語以外は、**決まった単語群から選ぶだけ**でいい
  - attempt, conduct, interpret, evaluate, determine, implement, formulate, classify, correlate, enhance, etc.
  - Vocabularyの項に、項目ごとの相応しい単語リストがついている

# この本の使い方

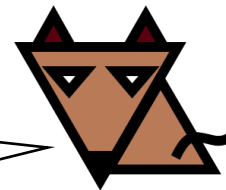
前回のおさらい



- この本の使い方
  - 既存の論文から学ぶ方法を知る
    - Writingのお手本として既存論文を読み込む方法
  - 論文を書くためのマニュアル
    - 論文構成のテンプレート、使える文法・単語のリスト
- 論文各章と対応した、章立て
  - Unit1: Introduction
  - Unit2: Methodology ← 今回ココの話
  - Unit3: Results
  - Unit4: Discussion or Conclusion
  - Unit5: Abstract and Title

# この本の使い方

前回のおさらい



- 全ての章は同じ構成で書かれている

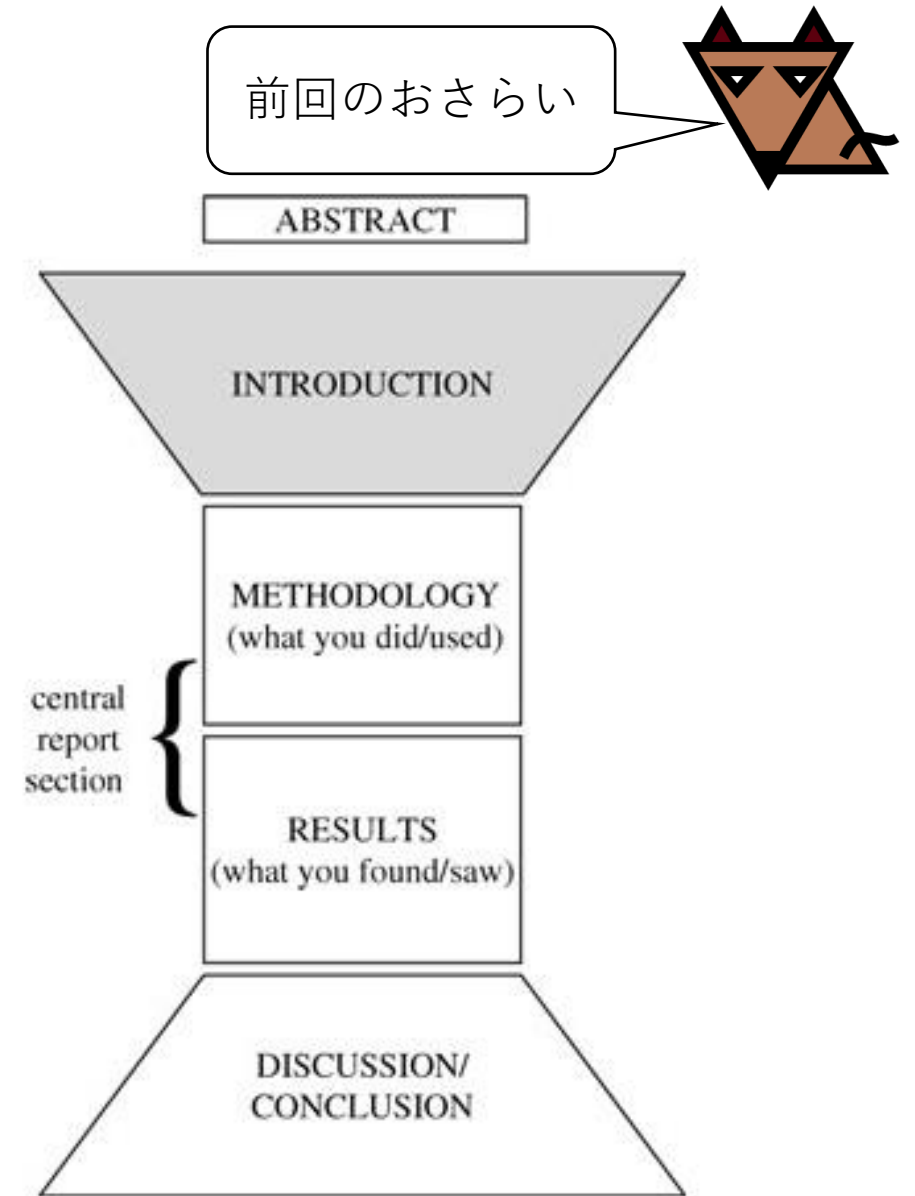
- 文献の例文
- 文法とライティング手法
- モデル（テンプレート）
- 頻出単語リスト
- 実際に書いてみる（課題）

自分の分野の論文を幾つか探して、それらと本書のコンセプトを対応づけながら読むことを推奨

※ただし、Nativeが書いたものを選ぶこと

# Unit1: Introduction

- Introductionの役割
  - Central report sectionへスムーズにつなげる
  - 一般的なことから、徐々にフォーカスを絞る
- Introductionはいつ書くか
  - Central Report Section（少なくともドラフト）を書いてから書くのがよい
- この章で説明すること
  - Introductionの書き出しはどうか
  - Introductionにどのような情報をどんな順番で書くか
  - Introductionの終わりはどうか



# Unit2: Writing about Methodology



- 呼び方は分野やJournalによる
  - Materials and Methods, Procedure, Experiments, Experimental, Simulation, Methodology or Model
- 多くのJournalには著者へのGuideがある
- 再現できるレベルの詳細を説明
- 読者が再現できるだけでなく、理解し受け入れられることが重要（⇒説得の要素が必要）

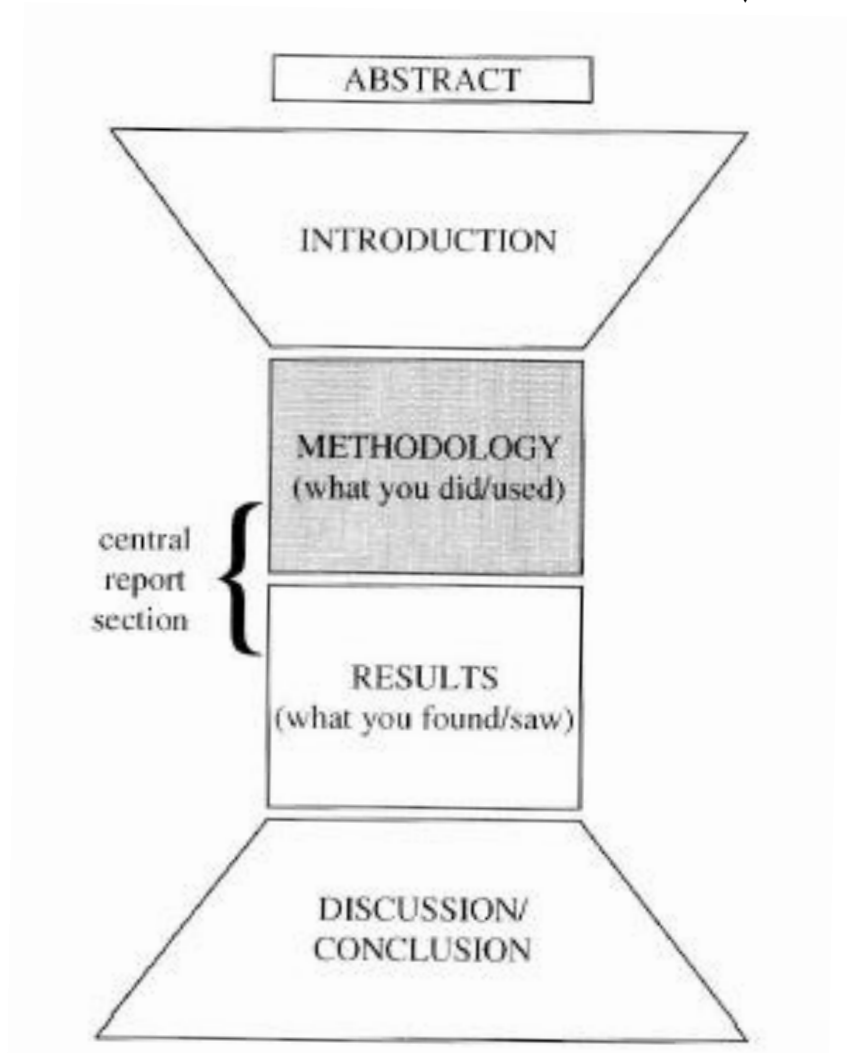


Fig. 1. The shape of a research article or thesis.



# Grammar and Writing Skills



- Methodologyセクションで重要な文法エリア

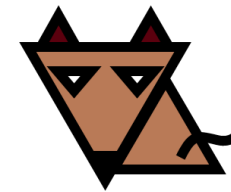
- Passive and tense pairs : 受動態と時制
- Use of 'a' and 'the' : 「a」と「the」の使い分け
- Adverbs and adverb location : 副詞と副詞を置く位置

# Passive and tense pairs: 受動態と時制



- 能動態か受動態か
  - Journal/Conferenceによる（それぞれのガイドを参照）
  - 研究グループの一員として行った研究では**能動態を使ってもよい**
  - PhD Thesisなど個人で行った研究は受動態
  - **ほとんどのケースは受動態**
- 論文中の受動態は、主語を省略する
  - We/I collected the samples.
  - The samples were collected. (by me)
- 時制は現在形か過去形
  - ほとんどのケースは、
    - **受動態の現在 (Present simple passive)**
    - **受動態の過去 (Past simple passive)**

# 標準的な手法と独自の手法の書き分け



- 使い分け
  - 標準的な手法： 受動態の現在 (Present simple passive)
  - 独自の手法 (自分がやったこと)： 受動態の過去 (Past simple passive)
- Samples for gas analysis **were collected** using the method described by Brown (1999), which **uses** a pneumatic air sampling pumps.
- ただし、標準的な手法を使って自分でやった場合など、Past Simpleで書くこともある
  - そこで、
  - 独自の手法だと分かるような工夫をする
    - In this study, ..., In our experiments, ...
    - Activeにする: We ...
    - Dummy subjectを使う： This experiment ...
  - 他人の手法の場合
    - Referenceを付ける
    - 人の手法だと示す： ... in their work, ... in their model, as in ...

# 補足：情報系論文の場合（私見）



- 本の中で取り扱う論文は実験系が多い
  - 実験（**人が行う手順**）が重要な分野
  - 行った手順を過去形で書く
- 情報系論文では**能動態の現在形**が多用されている
  - 能動態の使用
    - 「We xxx」という形がよく見られる
  - 現在形の使用
    - 例えば、ネットワーク構造の説明などは現在形しか使いようがない
    - 処理の手順についても人手で行わずコンピュータが行うので現在形のほうが自然
    - 「こういうチョイスをした」などの言い方で過去形が使われている
    - 「こういう実験を行った」なども過去形が使われる

# AとTHE



- 冠詞を付けるかどうか？
  - 単数の数えられる名詞には冠詞を付ける
  - しかし、数えられない名詞でも複数形で使われることがある
    - There has been three **deaths** this year.
    - Many **industries** rely on fossil fuels.
- 不加算名詞でも、使い方によって加算名詞になる単語に注意する（本文中にリストあり）
  - 常に不加算名詞の単語の例
    - access, advice, age, earth, electricity, ...
  - 加算名詞になりえる単語の例
    - absence, analysis, age, agriculture, cancer, ...

# AとTHE



- AとTheの使い分け
  - 「A」は一般的な参照 (General reference) ?
  - 「The」は特定の参照 (Specific reference) ?
- ⇒ **Not Really!**

# AとTHE



- AとTheの使い分け

- 自分と読者の両方がそれが何かを分かっている場合にTheを使う

- There is **a book** on the shelf above my desk; can you bring it here?
  - **a book**は特定の本を指すが、聞き手は現時点ではどの本か知らない
- I had a cheese sandwich and an apple for lunch. **The sandwich** was fine but **the apple** had a worm in it.
  - 最初の文で何者かが分かったので、次の文ではTheになる
- I bought a new computer but **the keyboard** was faulty.
  - 「computer」がでてきた時点で、読者はkeyboardの存在を認識する
- He lit a match but **the flame** went out.
  - 「match」がでてきた時点で、読者はflameを想像する

# AとTHE



- AとTheの使い分け

- お互いに同じものを認識しているシチュエーションでTheを使う
  - 2人が同じ部屋にいて、"Look up at **the ceiling**."と言われれば、"Which ceiling are you talking about?"とは言わない
  - 会話文で、"Did she get **the job**?"と聞けば、2人ともそのJobを認識していることをうかがわせる
- 参照しているものが1つしかない場合にTheを使う
  - Cairo is **the capital** of Egypt.
  - The opening was located in **the center** of each mesh.



# AとTHE



- AとTheの使い分け

- 著者がどれを参照していてもよい、もしくはどれを参照しているか知らない場合、読者がどれを参照しているか知らない場合、**A**を使う

- A 35 ml brown glass bottle was used to store the liquid.

- どのglassを使うかは重要ではない

- The subject then spoke to an interviewer.

- 私はどのinterviewerか知っているが、あなたはそれを気にしなくてもよい

- AとTheが変わると意味が変わる

- This effect may hide **a connection** between the two.

- つながりがあるかもしれないが、もしあったとしても我々にはそれが見えない

- This effect may hide **the connection** between the two.

- 確実につながりがあるが、我々にはそれが見えないかもしれない

# AとTHE



- AとTheの使い分け
  - A、The、及び（XXXs）複数形は全て、一般的な真実を表すときに使われる
    - **The electroencephalograph** is a machine for measuring brain waves.
    - **A electroencephalograph** is a machine for measuring brain waves.
    - **Electroencephalographs** are machines for measuring brain waves.
    - ↑ 全てOK

# Adverbs and adverb locations



- そのAdverbがどこにかかるかが分かりにくい
  - He gave a lecture about liver cancer at the hospital last January.
    - 病院でレクチャーがあったのか、病院で肝臓がんになったのか？
    - 1月に起きたがん症例のことなのか、1月にレクチャーがあったのか？
- 「安全に」 分かりやすく書く方法
  - Adverbを文頭に移す
    - -> Last January he gave a lecture about liver cancer at the hospital.
  - 文を分ける
    - -> Last January he gave a lecture at the hospital; his subject was liver cancer.

# Model (テンプレートの構成)



## 1. 概要

- Methodセクションの概要
- 目的や、機器のソース、その他必要な事前知識の説明

## 2. 詳細

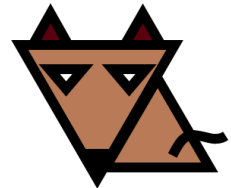
- 手法の詳細説明
- 手法の正しさの説明
- 適切に行われていると示す

## 3. 他手法との関連

## 4. 本手法の課題

1	PROVIDE A GENERAL INTRODUCTION AND OVERVIEW OF THE MATERIALS/METHODS  RESTATE THE PURPOSE OF THE WORK  GIVE THE SOURCE OF MATERIALS/EQUIPMENT USED  SUPPLY ESSENTIAL BACKGROUND INFORMATION
2	PROVIDE SPECIFIC AND PRECISE DETAILS ABOUT MATERIALS AND METHODS ( <i>i.e.</i> quantities, temperatures, duration, sequence, conditions, locations, sizes)  JUSTIFY CHOICES MADE  INDICATE THAT APPROPRIATE CARE WAS TAKEN
3	RELATE MATERIALS/METHODS TO OTHER STUDIES
4	INDICATE WHERE PROBLEMS OCCURRED





1 The current investigation involved sampling and analysing six sites to measure changes in groundwater chemistry. 2 The sites were selected from the London Basin area, which is located in the south-east of England and has been frequently used to interpret groundwater evolution. <sup>2,3,4</sup>	1. General overview of the section 2. Background info. and justification
3 A total of 18 samples was collected and then analysed for the isotopes mentioned earlier. 4 Samples 1–9 were collected in thoroughly-rinsed 25 ml brown glass bottles which were filled to the top and then sealed tightly to prevent contamination. 5 The filled bottles were shipped directly to two separate laboratories at Reading University, where they were analysed using standard methods suitably miniaturised to handle small quantities of water. <sup>5</sup>	3. Overview of the method itself 4. Details and cares taken 5. Details and cares taken
6 Samples 10–18 were prepared in our laboratory using a revised version of the precipitation method established by the ISF Institute in Germany. <sup>6</sup> 7 This method obtains a precipitate through the addition of BaCl <sub>2</sub> ·2H <sub>2</sub> O; the resulting precipitate can be washed and stored easily. 8 The samples were subsequently shipped to ISF for analysis by accelerator mass spectrometry (AMS). 9 All tubing used was stainless steel, and although two samples were at risk of CFC contamination as a result of brief contact with plastic, variation among samples was negligible.	6. Procedures following existing methods 7. Details and justification 8. Details 9. Possible difficulties



# 階層化とトップダウンでの説明



Methodology	例文
1 The current investigation involved sampling and analysing six sites to measure changes in groundwater chemistry. 2 The sites were selected from the London Basin area, which is located in the south-east of England and has been frequently used to interpret groundwater evolution. <sup>2,3,4</sup>	1. General overview of the section 2. Background info. and justification
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- まず全体像を示す
- Detailから書き出すと、読み手が勝手に間違った全体像を想像する
- 読み手に優しくないし、意図が正しく伝わらない
- トップダウンで説明することで、著者がコントロールできる

# 読者に手法を受け入れさせる



Methodology	例文
<b>1</b> The current investigation involved sampling and analysing six sites to measure changes in groundwater chemistry. <b>2</b> The sites were selected from the London Basin area, which is located in the south-east of England and has been frequently used to interpret groundwater evolution. <sup>2,3,4</sup>	1. General overview of the section 2. Background info. and justification
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- Methodologyは客観的な事実だけを述べるセクションではない
- 自分の方法が正しいことを示す
- 自分の方法の正しさを説得するような書き方が必要
  - 「他の人もこうやっていますよ」
  - 「しっかりやっていますよ」
- 読者がこの手法を受け入れることが大事

# 他の手法をReferenceする



- 他者の手法は現在形で書く、自分でやったことは過去形で書く
- Referenceの書き方は3通り
  1. 完全に同じ方法
  2. 少しだけ変えたがそれが重要ではない
  3. この方法とは違う方法、違いが重要

3の場合、違いも書く

Option1の単語例

according to	as reported by/in	given by/in
as described by/in*	as reported previously	identical to
as explained by/in	as suggested by/in	in accordance with
as in	can be found in	the same as that of/in
as proposed by/in	details are given in	using the method of/in

Option2の単語例

a (modified) version of	(very) similar	(to) adapt
adapted from	almost the same	(to) adjust
based in part/partly on	essentially the same	(to) alter
based on	largely the same	(to) change
essentially identical	practically the same	(to) modify
in line with	virtually the same	(to) refine
in principle	with some adjustments	(to) revise
in essence	with some alterations	(to) vary
more or less identical	with some changes	
slightly modified	with some modifications	

Option3の単語例

a novel step was...	although in many ways similar	(to) adapt*
adapted from*	although in some ways similar	(to) adjust*
based on*	although in essence similar	(to) alter*
in line with		(to) change*
it is recognised that	necessarily	quite good
less than ideal	impractical	reasonably robust
not perfect	as far as possible	however*
not identical	(it was) hard to	nevertheless*
slightly problematic	(it was) difficult to	<b>talk about a solution</b>
rather time-consuming	unavoidable	future work should...
minor deficit	impossible	future work will...*
slightly disappointing	not possible	currently in progress
negligible		currently underway
unimportant		
immaterial		
a preliminary attempt		
not significant		

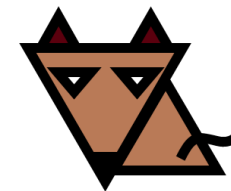




# 課題を書く

- 課題を書いたほうがプロフェッショナルに見える
- 見せないと隠しているように思われる
- Resultsに影響しない課題を書く
- もしくはより重要な課題でもここでふれたほうがよい（後で Discussion/Conclusionでもう一度触れる）
- ただし、上手く書く（次頁参照）
  - 課題を最小化するように
  - 自分の責任を最小化するように
  - 良い面を最大化するように
  - そして解決策を提案する

# 課題をうまく書くための単語



<b>minimise problem</b>	<b>minimise responsibility</b>	<b>maximise good aspects</b>
did not align precisely only approximate	limited by inevitably	acceptable fairly well
it is recognised that less than ideal not perfect not identical slightly problematic rather time-consuming minor deficit slightly disappointing negligible unimportant immaterial a preliminary attempt not significant	necessarily impractical as far as possible (it was) hard to (it was) difficult to unavoidable impossible not possible	quite good reasonably robust however* nevertheless*  <b>talk about a solution</b> future work should... future work will...* currently in progress currently underway

# 最後に



- 分野によってMethodology部の書き方はかなり違う
- 投稿するジャーナルやカンファレンスの論文をベースに、自分なりのModel（テンプレート）を生成してみるのがよい
- 本書はヒントがつまっているので、参考書的に引きながら書くのがよい