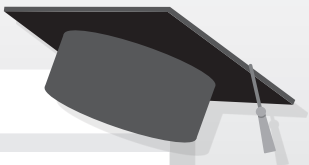
Unit 1
Introduction



Warm-up Questions

1. What is the purpose of the Introduction section?
2. What information elements are included in the Introduction section?
3. What are the salient linguistic features of the Introduction section?

1.1 Overview

1.1.1 Purpose of the Introduction Section

The main purpose of the Introduction section is to provide a reason for writing a particular paper, moving from a general discussion of the topic to the particular question of the hypothesis being investigated. It also aims to attract readers' interests in the topic. The reader will be more inclined to read a paper if the Introduction section is clear-cut, well-organized, and engaging. Now let's see what information elements should be included in the Introduction section.

1.1.2 Information Elements of the Introduction Section

The following are usually expected in the Introduction section of a thesis or dissertation:

- rationale for the research (or research background, reason/motivation of the study);
- aims and objectives;
- research questions;
- data;
- research method;
- theoretical framework;
- structure of the thesis or dissertation.

For relatively short essays, the following are worth including, in the following order:

- definitions of any terms in the title that are unclear;
- some background information;
- reference to other writers who have discussed this topic;
- the purpose of the writing and the importance of the subject;
- any limitations, e.g., geographical or chronological, that the writer sets;
- a summary of the main points the writer intends to cover.

1.1.3 Main Focus of Writing the Introduction Section

For the empirical study papers, John Swales (1990) proposed a Create-a-Research-Space (CARS) model: Three Moves in Research Paper Introduction, which includes: Move 1. Establishing a research territory; Move 2. Establishing a niche; Move 3. Occupying the niche. The linguistic realization of the three moves is as follows:

Move 1. Establishing a research territory:

- by showing that the general research area is essential, central, interesting, problematic, or relevant in some way (optional);
- by introducing and reviewing items of previous research in the area (obligatory).

Move 2. Establishing a niche:

- by indicating a gap in the previous research or by extending prior knowledge in some way (obligatory).

Move 3. Occupying the niche:

- by outlining purposes or stating the nature of the present research (obligatory);
- by listing research questions or hypotheses;
- by announcing principal findings;
- by stating the value of the present research;
- by indicating the structure of the research paper.

In summary, the information structure of the Introduction section is like an inverted triangular structure, as shown in Figure 1.1 below, making the statements from general to specific.

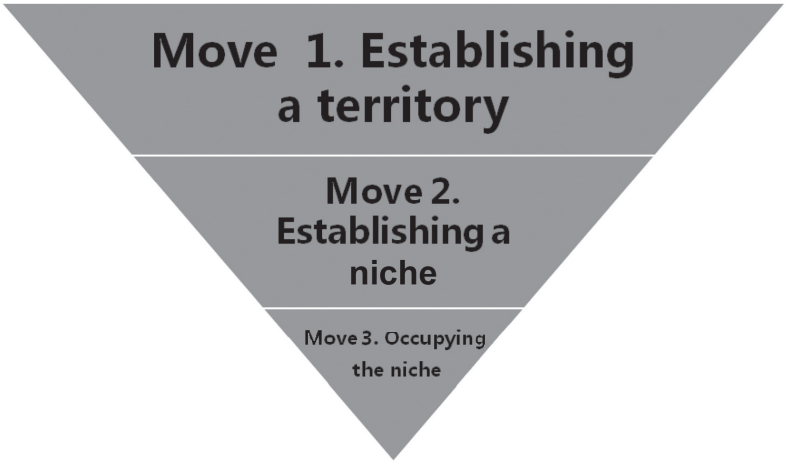


Figure 1.1 The Information Structure of the Introduction Section

1.2 Sample Analysis

Sample 1 (From the Field of Computer Science)

Sentences 1–5: **Move 1:** Establishing a research territory (by claiming centrality, making topic generalization(s)	**1)** Recently, because of the rise of deep learning, more and more people pay attention to the research and application of neural networks. **2)** Various programming frameworks are developed, and a wide range of high-performance tasks such as visual and speech recognition, language modeling, object detection, and medical diagnosis are demonstrated. **3)** Concurrently, neuromorphic computing aiming at mimicking brain intelligence has also experienced rapid development. **4)** Many neuromorphic platforms supporting the bio-plausible spiking neural networks (SNNs) are reported, such as TrueNorth, SpiNNaker, and Loihi. **5)** Besides various applications, the low power consumption benefit from the event-driven paradigm makes the neuromorphic chip quite promising for deployment on embedded devices.
Sentences 6–8: Introduction to the background and shortcomings of the previously adopted methods **Sentences 9–14:** **Move 2:** Establishing a niche (by indicating a gap in the previous research	**6)** Many-core architecture is widely adopted among the existing neural network chips due to the high parallelism via inter-core concurrency. **7)** This architecture usually removes the off-chip global memory. **8)** Instead, it pins the memory into every core for a better locality. **9)** However, this memory partition makes the model-to-core mapping more complicated when deploying neural network models on the chip. **10)** The scheme for mapping the logical cores describing the high-level model to the physical cores supporting low-level execution greatly influences the inter-core routing efficiency. **11)** If the mapping is not appropriate, the transmission of data packets is liable to be blocked, the routing time will be significantly increased, and the entire system's efficiency will be reduced. **12)** Therefore, it is necessary to optimize the mapping process.

Sentences 15–18: Three ways to avoid the routing deadlock are specifically proposed **Sentence 18:** Excluding the first two methods, and only considering the third method **Sentences 19–30:** **Move 3:** Occupying the niche (by outlining purposes and announcing principal findings)	**13)** Furthermore, the interconnection topology of existing many-core architectures is mostly in a 2D mesh, which is very similar to conventional Network on Chip (NoC). **14)** Similarly, there also exists a deadlock possibility under certain routing strategies, including point-to-point routing and multicast routing. **15)** There are three possible ways to avoid the deadlock: (1) design large buffer in the router module to accommodate packets as many as possible; (2) design smart routing strategy to guarantee deadlock-free trajectories of data movement; (3) add extra constraints during core placement to destruct the deadlock condition. **16)** Consider these three means in practice: First, the buffer size is usually a fixed value after chip fabrication which cannot always guarantee the non-full condition, so the first way is impractical; second, the deadlock-free routing strategy usually suffers from special constraints, which will cause an inefficient routing when the network becomes large. **17)** Moreover, if a workload requires multicast routing, it is very difficult to design a routing strategy to avoid deadlock. **18)** Therefore, the third way of adding extra deadlock-free constraints during core placement seems the only promising solution that focuses on our work. **19)** In this paper, we formulate the model-to-core mapping towards low-latency and deadlock-free performance as a constrained optimization problem. **20)** We use our developed Tianjic Chip as the objective mapping hardware, a coarse-grained multi-core neuromorphic chip. **21)** The chip is composed of 2D-mesh arranged neuromorphic cores. **22)** A core is the basic computing unit, including axon, synapse, dendrite, soma, and router modules. **23)** The axon module acts as a data buffer to store the inputs and the outputs. **24)** Synapses are designed to store on-chip weights and are pinned close to the dendrite for better memory localities. **25)** The dendrite is an integration engine that contains multipliers and accumulators. **26)** The soma is a computation unit for neuronal

Sentences 29–30: Stating value or justification for carrying out the current study	transformations. **27)** Intra-core and inter-core communications are realized by a router that supports arbitrary topology through packet transmission. **28)** Each core consists of 256 neurons, and multiple cores connection could perform larger network structures, e.g., a layer of a network or a whole network. **29)** Under the routing strategies with point-to-point and multicast paths, we incorporate two deadlock-free constraints and a simulated annealing algorithm to find a mapping scheme that minimizes the routing time, communication amount, and energy consumption for inter-core data movement. **30)** Then, we use multi-layer perceptron (MLP) and convolutional neural network (CNN) applications to evaluate our algorithm.
Sentences 31–36: Indicating paper structure	**31)** The rest of this paper is organized as follows. **32)** In Section 2, related works are briefly introduced. **33)** In Section 3, mapping preliminaries on the many-core architecture are provided, and the constrained optimization problem is formulated. **34)** Section 4 presents our mapping algorithm. **35)** Experimental results are shown in Section 5. **36)** Finally, we conclude the paper in Section 6. **Source:** Ma, C., Zhao, Q., Li, G., Deng, L. & Wang, G. 2020. A deadlock-free physical mapping method on the many-core neural network chip. *Neurocomputing, 401*: 327–337.

Sample 2 (From the Field of Public Management)

Sentences 1–3: **Move 1:** Establishing a research territory (from general to specific)	**1)** E-governance is the use of digital technologies by the government to improve how services are provided and transform government's overall functioning and effectiveness (Saxena, 2005; Torres, Pina & Acerete, 2006). **2)** Some scholars prefer e-governance rather than e-government to describe a similar range of government programs involving digital technology. **3)** Although the specific programs covered by both terms overlap, each term emphasizes a different way of organizing governmental authorities and institutions. **4)** E-government refers narrowly to public functions and

Sentence 4: Defining the term by distinguishing "e-government" from "e-governance	institutions that have become digitized; e-governance is a broader concept that refers to the digitization of all the relationships and the governmental and non-governmental factors that contribute to the services and policy-making functions of public institutions (Coe, Paquet & Roy, 2001; Saxena, 2005).
Sentence 5: **Move 2:** Establishing a niche **Sentences 6–13:** **Move 3:** Occupying the niche (by stating value or justification for carrying out the current study) The core issues explored in the article Ideas and methods to address the issues	**5)** Despite the growing debate about the development and direction of e-governance, the extent of its influence on public organizations remains an open question. **6)** In this article, we seek to add to this literature by adopting a global, evolutionary perspective to uncover patterns in trends at a historical and geographic level. For Torres et al. (2006), especially the city governments have posed interesting subjects for the study of e-governance. **7)** They tend to have regular interactions with citizens in a localized geographic region, thereby providing a lens for the citizen-government relationships that characterize governance processes. **8)** This study focused its attention on municipalities from around the world rather than the European Union cities studied by Torres et al. **9)** Furthermore, the world's e-governance capacity is steadily rising, and the time is ripe for improving our scholarly understanding of why this is the case as well as uncovering stories from cities at the forefront of this truly global shift in public administration. **10)** This article will answer three central questions concerning the evolution of global e-governance trends: (1) What e-governance features characterize the top e-governance performers? (2) Are cities steadily improving e-governance services, or is growth slowing over the time? (3) Are there any consistent patterns to e-governance development? **11)** This paper provides a descriptive analysis of an original data source and an in-depth analysis of seven high-performing city websites to address the first and second questions. **12)** To explore the third research question, we apply descriptive analyses and further conceptual analysis to assess different

Sentence 13: The significance of the research	global rates of change and e-governance achievements. **13)** Through these analyses, we also create a typology of global e-government evolution. **Source:** Manoharan, A. P., Ingrams, A., Kang, D. & Zhao, H. 2021. Globalization and worldwide best practices in e-government. *International Journal of Public Administration, 44*(6): 465–476.

1.3 Linguistic Features of the Introduction Section

The Introduction is the first and also the key section for both the reader and the writer. It gives the first impression to the reader. For the writer, the Introduction section serves as a transition by moving the reader from the world outside of the paper to the world within. To some extent, a carefully crafted Introduction section acts as a springboard, establishing the order and direction for the entire paper. Whether short or long, Introduction sections should be intelligently structured with explicit language. In the following, we will analyze the language of the Introduction sections in terms of lexical features and syntactical features.

1.3.1 Lexical Features

There are some commonly used vocabularies and sentence structures corresponding to the three moves of the Introduction section. In the following, some frequently used words and sentence structures are provided to facilitate the writers in the writing process.

1. Commonly used verbs or phrases

The commonly used verbs or phrases for claiming centrality are: “is/are”, “pay attention to”, “concentrate on”, “concern”, “grow”, “find”, “pursue”, “study”, “develop”, “improve”, “use”, “generate”, “focus on”, “turn to”, “become”, etc. For example:

- ✓ Recently, more and more people **pay attention to** the research and application of…
- ✓ Many recent studies **have focused on**…
- ✓ One major issue in early… research **concerned**…
- ✓ The issue **has grown** in importance in light of recent…
- ✓ The… **has been extensively studied** in recent years.
- ✓ The possibility of… **has generated** wide interest in…
- ✓ The study of… **has become** an important aspect of…

- ✓ Human beings **have pursued** well-being since ancient times.
- ✓ … **is** one of the principal claims of a modern public management.
- ✓ … **is** a popular way of specifying, designing, and verifying hardware systems.
- ✓ … **are** some of the most widely used seismic structure forms at present.

The commonly used verbs for indicating gaps include: "neglect", "overlook", "underestimate", "challenge", "debate", "suffer", "limit", etc. For example:

- ✓ Previous research in this field **has neglected**…
- ✓ Previous research **has overlooked**…

The commonly used verbs for outlining purposes are: "specify", "report", "introduce", "provide", etc. For example:

- ✓ Related works **are briefly introduced**…
- ✓ … **are provided**…

2. Commonly used transitional words and negative adjectives for establishing a niche

The commonly used transitional words for establishing a niche include: "however", "unfortunately", "yet", "nevertheless", "although", "despite", etc. For example:

- ✓ **However**, previous research in this field has been restricted to…
- ✓ **Unfortunately**, there is still no in vivo method available at present.
- ✓ **Yet**, the forces behind this reaction are still not fully understood.
- ✓ **Although** many colleges and universities have… courses and majors, few have attempted to include… perspectives in their general coursework.

Negative adjectives are also frequently used in indicating the gap, which may include: "controversial", "conflicting", "unconvincing", "questionable", "incomplete", "unsatisfactory", "disputed", "inconsistent", etc. For example:

- ✓ Nevertheless, these attempts to establish a link between secondary smoke and lung cancer are at present **unconvincing**.
- ✓ However, the literature provides **conflicting** evidence on the nature and extent of the earnings information contained in dividend announcements.
- ✓ The issue of… has been a **controversial** and much-**disputed** subject within the field of…
- ✓ Moreover, we find that these peer effects are **inconsistent** with rational responses to information flowing through the employee network.

3. Commonly used words or phrases for expressing needs/interests/desires

After the gap is indicated, the writer often tells the readers what needs to be done or

should be done by using "need to be", "be of interest to", etc. For example:

- ✓ The differences **need to be** analyzed.
- ✓ It would thus **be of interest to** learn how…
- ✓ It **is desirable / of interest to** compare…
- ✓ It would seem, therefore, that further investigations **are needed** in order to…

4. Commonly used modal verbs for stating value or justification

Modal verbs such as "could", "may", "can", "might" are often used for stating value or justification for carrying the current study. For example:

- ✓ The model described here **could** serve as the basis for a study of automatic measurement systems.
- ✓ Both factors under investigation in this study **may** be of importance in explaining the irregular occurrence of this disease.
- ✓ As a move in this direction, I hope that the present small-scale study **could** serve as a starting point to later, possibly more sophisticated, research of a comparative nature.

1.3.2 Syntactical Features

There are also some syntactical features in writing the Introduction section, like using contrastive statements and descriptive sentences frequently. In the following, the usage of these sentences will be presented.

1. Making references

In Move 1 of the Introduction section, the writer often reviews some items or relevant studies of previous research in the area by making references. For example:

- ✓ Scholars have long debated the impact of… on…
- ✓ A much debated question is whether…
- ✓ One of the most significant current discussions in… is…
- ✓ Many researchers have found that in some countries…
- ✓ E-governance is the use of digital technologies by the government to improve how services are provided and transform government's overall functioning and effectiveness (Saxena, 2005; Torres, Pina & Acerete, 2006).

2. Statements for questions and challenges for establishing a niche

In Move 2, some writers establish a niche by raising questions. For example:

- ✓ However, **it remains unclear whether**…
- ✓ These findings suggest that this treatment **might not be so effective** when applied to…