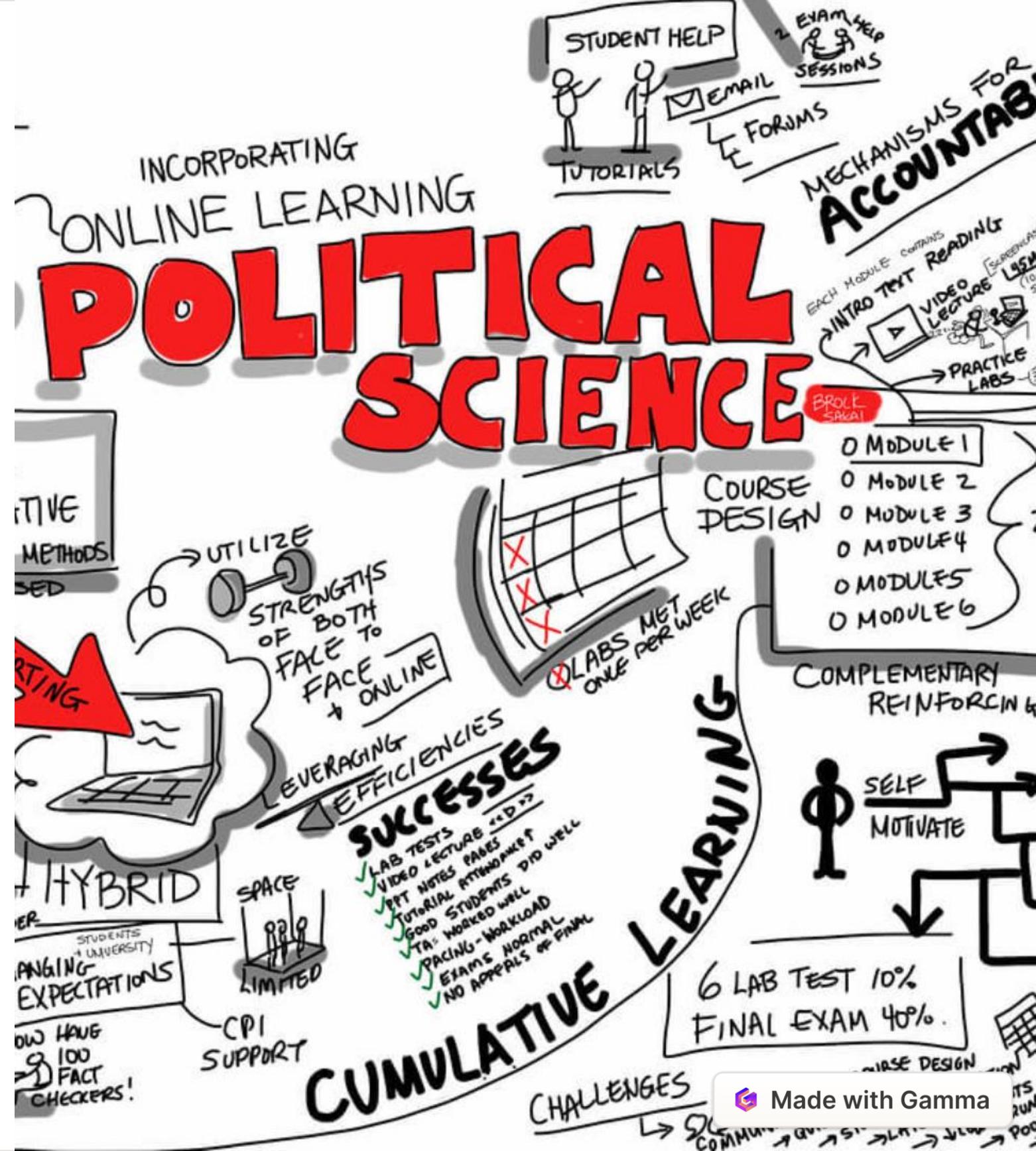


QCA在政治學領域的應用

國立中山大學中國與亞太區域研究所

黎寶文 助理教授

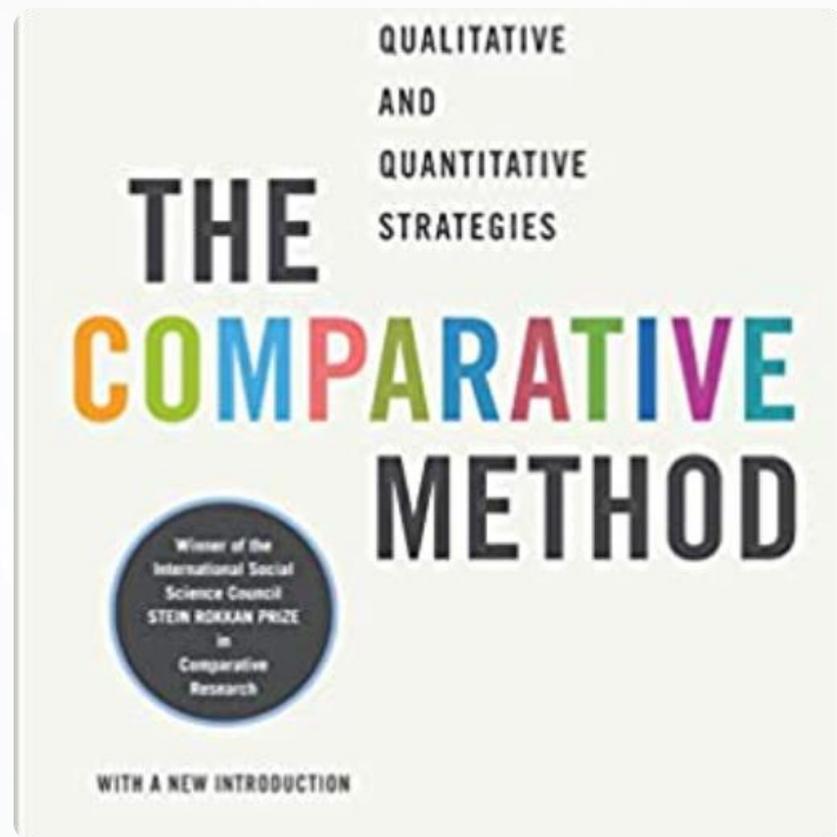




探索政治現象的鑰匙： 質性比較分析

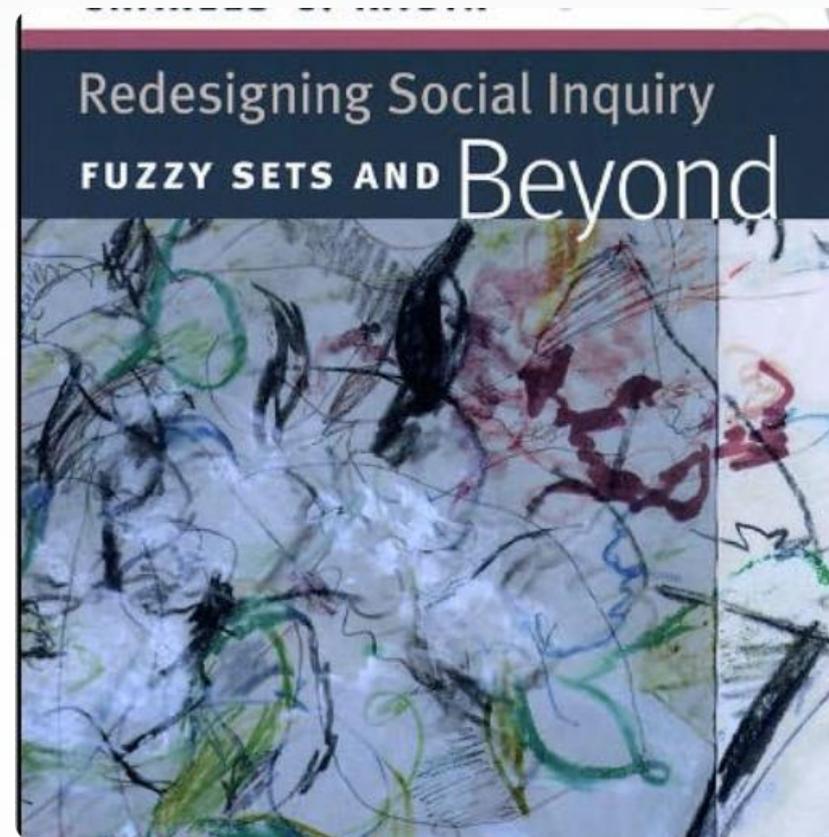
- 1 質性比較分析 (Qualitative Comparative Analysis, QCA)
- 2 以集合論 (set theory) 與布林運算邏輯 (Boolean algebra) 為基礎
- 3 確認必要條件、充份條件、充要條件

QCA的新手村



Ragin, Charles C.

University of California Press,
1987/2014.



Ragin, Charles C.

University of Chicago Press,
2010.

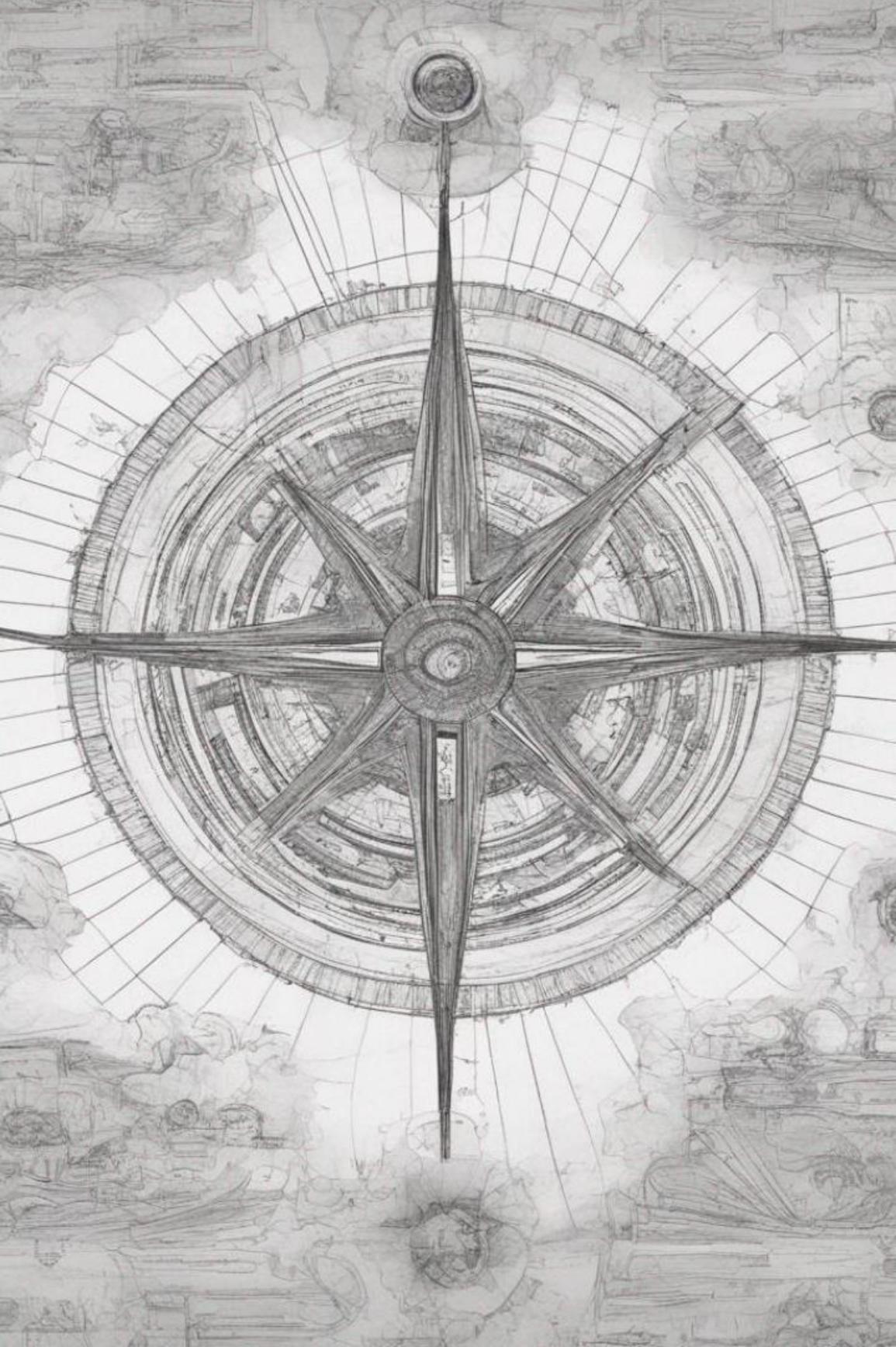


Compass

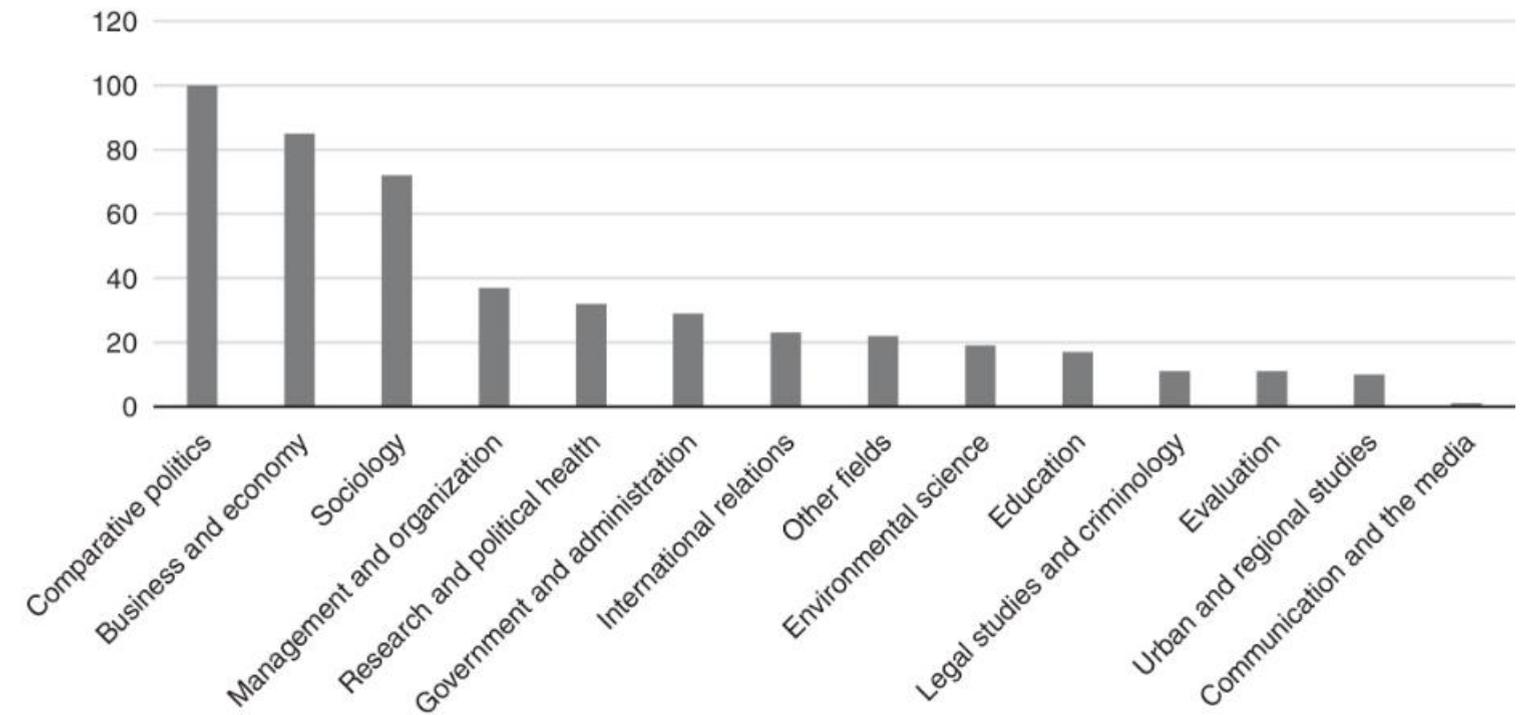
<https://compasss.org/>



QCA在學術領域的運用



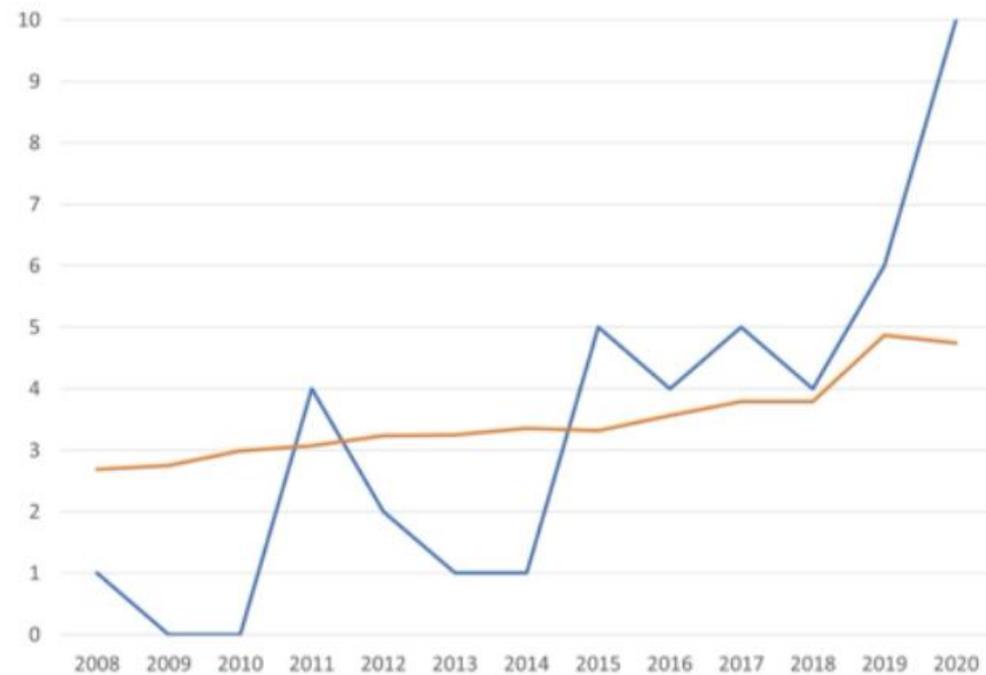
Compass 資料庫論文領域 (2016)



Roig-Tierno, N., Gonzalez-Cruz, T. F., & Llopis-Martinez, J. (2017). An overview of qualitative comparative analysis: A bibliometric analysis. *Journal of Innovation & Knowledge*, 2(1), 15–23.

國際關係SSCI期刊QCA論文數

Figure 1. QCA studies in IR journals per year (blue line) and the total number of articles in IR journals (in 1.000s) ...



Int Stud Rev, Volume 24, Issue 1, March 2022, viac008, <https://doi.org/10.1093/isr/viac008>

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Ide, T., & Mello, P. A. (2022). QCA in International Relations: A Review of Strengths, Pitfalls, and Empirical Applications. 1–20.

國際關係SSCI期刊中QCA論文數

- 1 1987-2020年共43篇
- 2 2008年出現第1篇，2011年第2篇
- 3 主題：conflict, environment, foreign policy

Ide, T., & Mello, P. A. (2022). QCA in International Relations: A Review of Strengths, Pitfalls, and Empirical Applications. *International Studies Review*, 24(1), 1–20.



QCA的邏輯

Cause-of-effect, INUS causation, causal paths

質化與量化研究的比較

Table 1 Contrasting qualitative and quantitative research

<i>Section</i>	<i>Criterion</i>	<i>Qualitative</i>	<i>Quantitative</i>
1	Approaches to explanation	Explain individual cases; “causes-of-effects” approach	Estimate average effect of independent variables; “effects-of-causes” approach
2	Conceptions of causation	Necessary and sufficient causes; mathematical logic	Correlational causes; probability/statistical theory
3	Multivariate explanations	INUS causation; occasional individual effects	Additive causation; occasional interaction terms
4	Equifinality	Core concept; few causal paths	Absent concept; implicitly large number of causal paths
5	Scope and generalization	Adopt a narrow scope to avoid causal heterogeneity	Adopt a broad scope to maximize statistical leverage and generalization
6	Case selection practices	Oriented toward positive cases on dependent variable; no (0,0,0) cases	Random selection (ideally) on independent variables; all cases analyzed
7	Weighting observations	Theory evaluation sensitive to individual observations; one misfit can have an important impact	All observations are a priori equally important; overall pattern of fit is crucial
8	Substantively important cases	Substantively important cases must be explained	Substantively important cases not given special attention
9	Lack of fit	Nonconforming cases are examined closely and explained	Nonsystematic causal factors are treated as error
10	Concepts and measurement	Concepts center of attention; error leads to concept revision	Measurement and indicators center of attention; error is modeled and/or new indicators identified

Mahoney, James, and Gary Goertz. “A Tale of Two Cultures: Contrasting Quantitative and Qualitative Research.” *Political Analysis* 14, no. 3 (2006): 227–49.

影響成因？因果效應？

Cause of Effect

$$\underline{A} \rightarrow Y$$

Conditional causes, inductive, case-orientated

Effect of Cause

$$Y = \underline{a}X + b$$

Correlational causes, deductive, variable-orientated

詮釋邏輯

Set Theory

Union: $A \cup B \longrightarrow A, \text{ or } B, \text{ or both}$

Intersection: $A \cap B \longrightarrow \text{both}$

Superset vs subset

Boolean Algebra

AND (*) \longrightarrow combination, OR (+) \longrightarrow paths

Value: false or true (0, 1); degree (0-1), not real numbers

因果條件 (Causal Conditions)

1 必要條件

$$A*b + A*c \longrightarrow Y$$

$$A*B*C \longrightarrow Y$$

2 充分條件

$$\underline{A*c + B*c} \longrightarrow Y$$

$$A*B*C \longrightarrow Y$$

3 充要條件

$$A \longrightarrow Y$$

測驗：

1. 假設氧氣、溫度與助燃物是燃燒三個要件。氧氣是燃燒的什麼條件？
2. 因為跟女朋友分手，所以刪掉臉書帳號。跟女朋友分手是刪臉書帳號的什麼條件？
3. 民主國家間不會戰爭。任一國家是民主國家是和平的什麼條件？
4. 挑戰者實力趨近於霸權，同時不滿現狀，導致霸權戰爭。挑戰者不滿現狀是霸權戰爭的什麼條件？

Allison, Graham. (2017). *Destined for War?*

Table 1: Thucydides's Trap Case File

Nº	Period	Rulling Power	Rising Power	Domain	Result
1	Late 15th century	Portugal	Spain	Global empire and trade	No War
2	First half of 16th	France	Hapsburgs	Land power in western Europe	War
3	16th and 17th centuries	Hapsburgs	Ottoman Empire	Land power in central and eastern Europe, sea power in the Mediterranean	War
4	First half of 17th century	Hapsburgs	Sweden	Land and sea power in northern Europe	War
5	Mid-to-late 17th century	Dutch Republic	England	Global empire, sea power and trade	War
6	Late 17th to mid-18th centuries	France	Great Britain	Global empire and European land power	War
7	Late 18th and early 19th centuries	United Kingdom	France	Land and sea power in Europe	War
8	Mid-19th century	France and United Kingdom	Russia	Global empire, influence in Central Asia and eastern Mediterranean	War
9	Mid-19th century	France	Germany	Land power in Europe	War
10	Late 19th and early 20th centuries	China and Russia	Japan	Land and sea power in East Asia	War
11	Early-20th century	United Kingdom	United States	Global economic dominance and naval supremacy in the Western Hemisphere	No War
12	Early-20th century	United Kingdom supported by France and Russia	Germany	Land power in Europe and global sea power	War
13	Mid-20th century	Soviet Union, France, United Kingdom	Germany	Land and sea power in Europe	War
14	Mid-20th century	United States	Japan	Sea power and influence in the Asia-Pacific region	War
15	1940s-1980s	United States	Soviet Union	Global power	No War
16	1990s-present	United Kingdom and France	Germany	Political influence in Europe	No War

Source: Allison, 2017, p.42.

本表皆為實力接近案例，假設權力接近為A，挑戰者不滿現狀為B，挑戰者滿意現狀為b，則

1. $A*B \rightarrow \text{War}$

2. $A*B + A*b \rightarrow \text{No War}$ ($A*b$ cases: 11, 16)

Problematic: $A \rightarrow \text{No War}$

討論：

1. Allison的推論是量化邏輯還質化邏輯？

2. Allison的案例選擇或研究設計有無問題？

小心混進QCA的量化概念

- If "—>" then, "=" is not "sufficient"
- Solutions vs. Models
- Conditions vs. Variables
- Population vs. Sample
- Confounding Conditions vs. Control Variables
- Logical Remainders vs. Missing Data

Rutten, Roel and Claude Rubinson (2022) "A Vocabulary for QCA." <https://compasss.org/wp-content/uploads/2023/02/vocabulary.pdf>

King, G., Keohane, R. O., & Verba, S. (1994). *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Princeton University Press.

QCA的應用

1. Crisp-set (cs) QCA: 0 or 1, a or A
2. Fuzzy-set (fs) QCA: 0, 0.33, 0.67, 1
3. Multi-value (mv) QCA: 1, 2, 3, 4, 5

如何進行QCA？

1. 說明採用特定類型QCA的原因
2. 建構真值表
3. 必要與充分條件分析：Consistency score, Coverage score
4. 條件中位數為5，案例中位數為28，案例條件比為5.6
5. 化簡程度：複雜解（complex solution）、中間解（intermediate solution）、簡約解（parsimonious solution）
6. 揭露使用之QCA軟體
7. 建議作為：穩健性測試（testing robustness），混合方法（Mixed methods）

Ide, T., & Mello, P. A. (2022). QCA in International Relations: A Review of Strengths, Pitfalls, and Empirical Applications. *International Studies Review*, 24(1), 1–20.

Crisp-Set QCA 案例

黎寶文. (2022). 中國對美衝突與合作之探討：一個質性比較分析的途徑. 遠景基金會季刊, 23(3), 55–115.

條件：國際權力結構（雙極=1, 多極=0）、美中權力對比（差距大=1, 差距小=0）、國內偏好（修正主義=1, 維持現狀=0）、美國對中政策（衝突=1, 合作=0）

結果：中國對美行為（衝突=1, 合作=0）

研究資料：歷屆中共全國代表大會政治報告（1949-2019）

分析單位：中共領導人統治時期（毛、習各劃為兩個時期，共8個單位）

真值表

表 7 各變項真值表

自變項				依變項	
國際結構	權力對比	國家偏好	美國對中政策	中國對美政策	個案數
1	1	1	1	1	1 (毛 1)
1	1	1	0	0	1 (毛 2)
1	1	0	0	0	2 (華、鄧)
0	1	0	0	0	2 (江、胡)
0	0	1	0	1	1 (習 1)
0	0	1	1	1	1 (習 2)

資料來源：作者自行製表。

- 對美衝突 = 國際結構 * 權力對比 * 國家偏好 * 美國對中政策 + 國際結構 * 權力對比 * 國家偏好 * 美國對中政策 + 國際結構 * 權力對比 * 國家偏好 * 美國對中政策
- 對美合作 = 國際結構 * 權力對比 * 國家偏好 * 美國對中政策 + 國際結構 * 權力對比 * 國家偏好 * 美國對中政策 + 國際結構 * 權力對比 * 國家偏好 * 美國對中政策

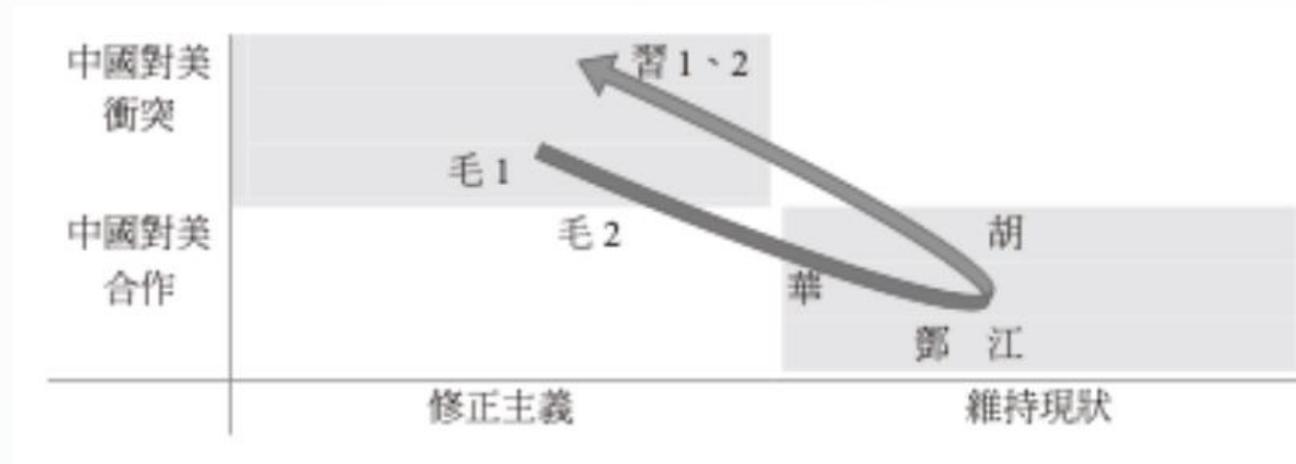
對美衝突條件分析

對美衝突

= 國際結構*權力對比*國家偏好*美國對中政策 + 國際結構*權力對比*國家偏好*美國對中政策 + 國際結構*權力對比*國家偏好*美國對中政策

= 國際結構*權力對比*國家偏好*美國對中政策 + 國際結構*權力對比*國家偏好

必要條件：國家偏好（修正主義路線）



對美衝突因果路徑圖



兩組充要條件 = 兩條因果路徑

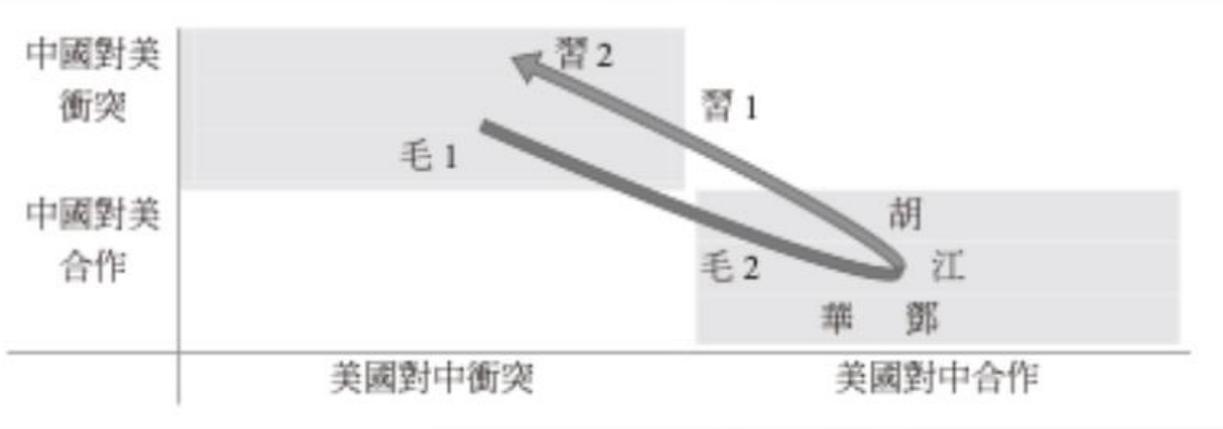
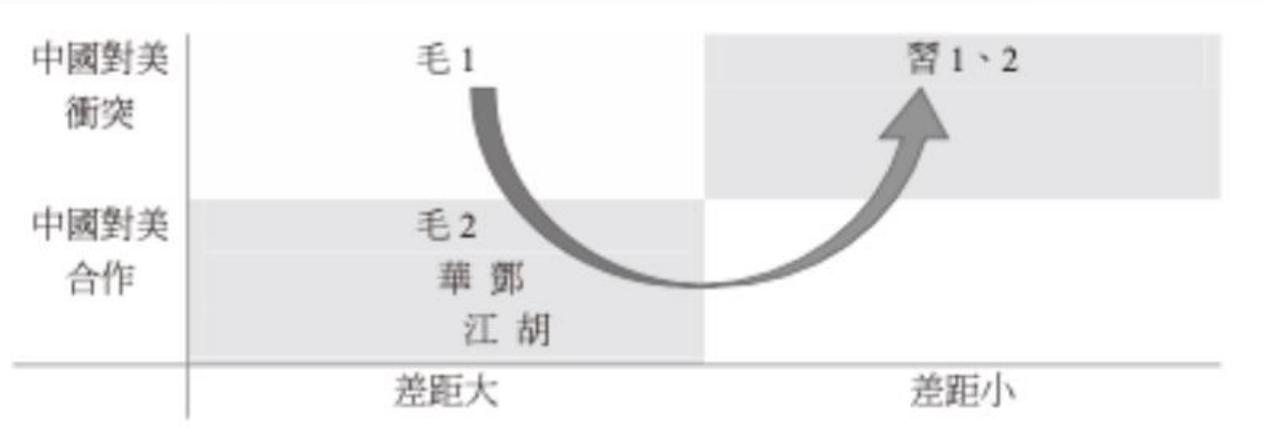
對美合作條件分析

對美合作

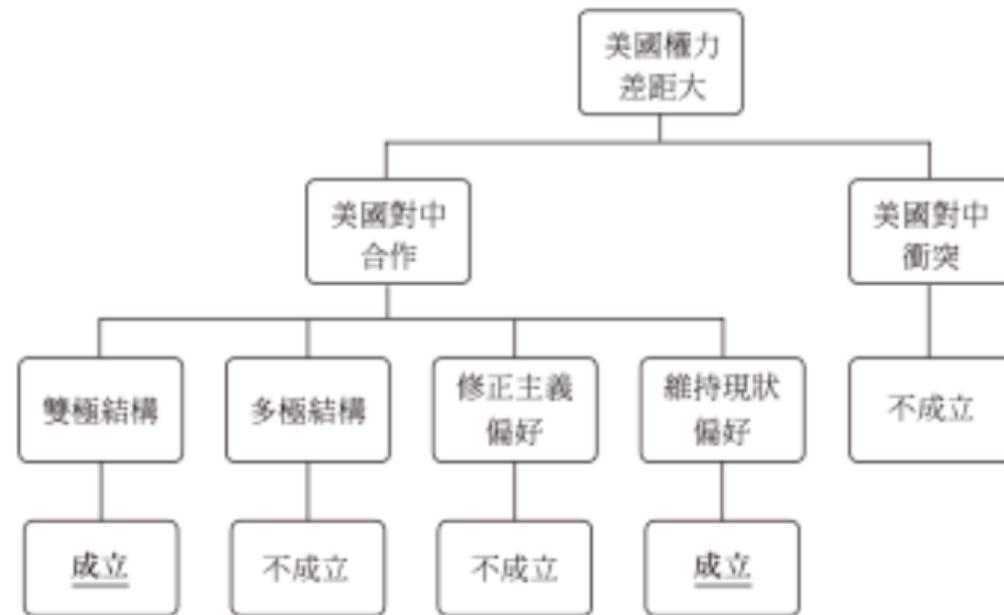
= 國際結構*權力對比*國家偏好*美國對中政策 + 國際結構*權力對比*國家偏好*美國對中政策 + 國際結構*權力對比*國家偏好*美國對中政策

= 國際結構*權力對比*美國對中政策 + 權力對比*國家偏好*美國對中政策

必要條件：權力對比*美國對中政策 (權力差距大*美國對中合作)



對美合作因果路徑圖



兩組充要條件 = 兩條因果路徑

Fuzzy-Set QCA 案例

黎寶文. 美國對中衝突與合作之因果條件分析. 2022年研討會論文

條件：國際權力結構（雙極=1, 雙極崩解=0.67, 多極=0）、存在共同敵人（存在=1, 不存在=0）、權力對比（差距大=1, 差距漸小=0.67, 差距小=0）、中國對現行美中關係評價（不滿=1, 些許不滿=0.67, 些許滿意=0.33, 滿意=0）

結果：中國對美行為（衝突=1, 合作=0）

研究資料：美國外交檔案（1949-2021）、GDP & CINC、北京清華大學中外關係數據庫

分析單位：美國總統任期（共19個單位）

使用軟體與化簡程序

- 軟體：fsQCA，為 Ragin 教授所開發之 4.1 Mac 版本，可於網站取得。
<https://sites.socsci.uci.edu/~cragin/fsQCA/software.shtml>
- 化簡選項：簡約解 (parsimonious solution)
- 邏輯餘項 (Remainders)：真值表上邏輯上可存在，但現實中不存在的觀察值，或可視為「反事實」(counterfactual cases)。在多數情況下，由現實世界觀察歸納出的真值表，不可能包含所有可能發生情況。