# 中介、調節、與條件程序分析

# Mediation, Moderation, and Conditional Process Analysis

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## 講師簡介

Andrew Hayes教授是中介與調節分析領域最頂尖的學者之一他的研究專注在線性模式，特別是重抽樣推論。根據Google Scholar，他的研究已經被全球跨領域的學者引用超過六萬次。他在方法方面的期刊論文，出版在*Psychological Methods*、*Multivariate Behavioral Research*、*Behavior Research Methods*、*Behaviour Research and Therapy*、*Psychological Science*、*Australiasian Marketing Journal*、*Communication Methods and Measures*、*Human Communication Research*、*Communication Monographs*等期刊。他並出版*Regression Analysis and Linear Models*（2017）、*An Introduction to Mediation, Moderation, and Conditional Process Analysis*（2018）、*Statistical Methods for Communication Science*（2005）等專書。

## Short Biography

Professor Andrew Hayes’s research focuses on linear models, with an emphasis on resampling methods of inference. According to Google Scholar, his work has been cited over 60,000 times by scholars throughout the world in nearly every empirical research area. His methodological work has appeared in *Psychological Methods, Multivariate Behavioral Research, Behavior Research Methods, Behaviour Research and Therapy, Psychological Science, Australiasian Marketing Journal, Communication Methods and Measures, Human Communication Research,* and *Communication Monographs*, among others. He is the author of *Regression Analysis and Linear Models* (2017, The Guilford Press), *An Introduction to Mediation, Moderation, and Conditional Process Analysis* (2018, The Guilford Press), and *Statistical Methods for Communication Science* (2005, Routledge)*.*

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| 主辦單位 交通大學人文與社會科學研究中心  政治大學政治大學台灣政經傳播研究中心 | Organizer Research Center for Humanities and Social Sciences, National Chiao Tung University  Taiwan Institute for Governance and Communications Research, National Chengchi University |
| 時間 2018年5月19日（六）-20日（日） 地點 政治大學大勇樓基礎數位實驗室 | Time Saturday, May 19, 2918 – Sunday, May 20, 2018 Place Room 315, Da Yong Building, National Chengchi University |

## 簡介

中介（mediation）與調節（moderation）統計分析是社會科學領域被廣泛使用、但常令人混淆的計量方法。中介分析檢視「因果關係發生的機制」，指自變項對依變項的影響至少有部分是透過中介變項（mediator）產生；調節分析檢視「因果關係發生的條件」，指自變項對依變項的影響因調節變項（moderator）不同而改變，亦被稱為交互作用（interaction）。近年，結合中介與調節的研究逐漸增加，在分析上整合兩者的條件程序分析（conditional process analysis）也隨之誕生。中介與調節分析可以說是任何實證學者在進行研究工作時必備的知識。這次工作坊將從一般最小平方（ordinary least squares）迴歸分析的角度，深入說明中介、調節、與條件程序分析的基礎原則，及講者針對SPSS統計軟體所開發之PROCESS巨集（3.0版）的新功能、應用與範例。

## Description

Statistical mediation and moderation analyses are among the most widely used, but often confused, data analysis techniques in social science. Mediation analysis is used to test hypotheses about various intervening mechanisms by which causal effects operate. Moderation analysis is used to examine and explore questions about the contingencies or conditions of an effect, also called “interaction.” Increasingly, moderation and mediation are being integrated analytically in the form of what has become known as “conditional process analysis,” used when the goal is to understand the contingencies or conditions under which mechanisms operate. An understanding of the fundamentals of mediation and moderation analysis is in the job description of almost any empirical scholar. In this course, you will learn about the underlying principles and the practical applications of these methods using ordinary least squares (OLS) regression analysis and the PROCESS macro (version 3.0) for SPSS invented by the course instructor.

## 工作坊目標

* 能從統計的角度區分一個變項對另一個變項的直接與間接效果
* 了解因果關係模式中間接效果推論的發展與最新作法
* 了解如何經由比較多中介變項模式的間接效果，從統計的角度檢驗互相競爭的理論
* 具備調查與視覺化迴歸模型中交互作用的能力
* 習得如何將涉及調節與中介的模式整合為條件程序模式
* 習得如何透過條件間接效果的計算與推論，估計特定因果關係發生的可能性
* 了解如何決定特定因果關係是否受到調節變項的影響
* 使用現有統計軟體即可使用本工作坊所討論的方法
* 能夠已有根據的方式談論與撰寫因果關係的過程與發生的可能性

## Workshop objectives. By the end of this workshop, you will …

* be able to statistically partition one variable’s effect on another into its primary pathways of influence, direct and indirect.
* understand historical and modern approaches to inference about indirect effects in causal models.
* know how test competing theories of mechanisms statistically through the comparison of indirect effects in models with multiple mediators
* acquire an understanding of how to build flexibility into a regression model that allows a variable’s effect to be a function of another variable in a model.
* have the ability to visualize and probe interactions in regression models.
* have learned how to integrate models involving moderation and mediation into a conditional process model.
* have learned how to estimate the contingencies of mechanisms through the computation and inference about conditional indirect effects.
* know how to determine whether a mechanism is dependent on a moderator variable.
* be able to apply the methods discussed in this course using readily-available statistical software.
* be in a position to talk and write in an informed way about the mechanisms and contingencies of causal effects.

## 工作坊內容

* 路徑分析：中介模型中的直接效果、間接效果、與總效果
* 單一中介變項模型中，間接效果的估計與推論
* 多中介變項模型
* 調節效果與條件效果估計
* 調查與視覺化交互作用
* 條件程序分析（調節式中介）
* 條件間接效果的定量與推論
* 檢驗調節式中介假設與比較條件間接效果

這次工作坊主要關注依變項為連續變項的實驗研究或橫斷面研究，沒有包含依變項為二分變項、潛在變項、重複測量、層次資料（也就是多層次模型）、或結構方程模型等複雜模型。

## Topics covered

* Path analysis: Direct, indirect, and total effects in mediation models.
* Estimation and inference about indirect effects in single mediator models.
* Models with multiple mediators.
* Estimation of moderation and conditional effects.
* Probing and visualizing interactions.
* Conditional process analysis (“moderated mediation”)
* Quantification of and inference about conditional indirect effects.
* Testing a moderated mediation hypothesis and comparing conditional indirect effects.

**What is not covered**. We focus primarily on research designs that are experimental or cross-sectional in nature with continuous outcomes. We do not cover complex models involving dichotomous outcomes, latent variables, repeated measures, nested data (i.e., multilevel models), or the use of structural equation modeling.

## 推薦書目

這次的工作坊可以與講師以下的著作搭配。是否閱讀這本書籍不會影響對工作坊內容的吸收，但可以增進瞭解。

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York, NY: Guilford Press.

## Recommended book

This course is a companion to the instructor’s book below. A copy of the book is not required to benefit from the course, but it could be helpful to reinforce understanding.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York, NY: Guilford Press.

## 先備知識

工作坊參與者需具備多元迴歸及統計推論的基礎知識，並熟悉SPSS統計軟體。

**Course prerequisites**. Participants should have a basic knowledge of the principles and practice of multiple regression and statistical inference. Familiarity with the use of SPSS is assumed.

## 計算工具

This is a hands-on course. Computer applications will focus on the use of ordinary least squares regression and the PROCESS macro for SPSS developed by the instructor that makes the analyses described in this workshop much easier than they otherwise would be.

## Computing technology

這是一門將理論與分析結合的實際上機操作課程。電腦應用針對普通最小平方迴歸及講師開發的PROCESS巨集（SPSS版），使得進行中介、調節、及條件過程分析變得非常容易。

# 工作坊課程表

# Workshop Schedule

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| --- | --- | --- |
|  | **5/19（六）**  **5/19 (Saturday)** | **5/20（日）**  **5/20 (Sunday)** |
| **8:30-8:50** | Registration | Registration |
| **8:50-9:00** | Opening Remarks |
| **9:00-10:30**  (90 minutes) | **Fundamentals of mediation analysis; path analysis algebra** | **Fundamentals of linear moderation analysis** |
| **10:30-10:45** | 休息  Break | 休息  Break |
| **10:45-12:30**  (105 minutes) | **Introduction to PROCESS; Further examples of mediation analysis** | **Probing Interactions: Pick-a-point and Johnson-Neyman techniques** |
| **12:30-13:30** | 午餐  Lunch Break | 午餐  Lunch Break |
| **13:30-15:00**  (90 minutes) | **Confounding and variable scaling** | **Myths of moderation analysis; Introduction to conditional process analysis** |
| **15:00-15:15** | 休息  Break | 休息  Break |
| **15:15-17:00**  (105 minutes) | **Problems with traditional approaches; More than one mediator** | **Conditional process analysis examples; Where to go for More complex problems** |
| **17:00-17:30** | Q & A | Q & A |