

SCIU4T4 Module overview

- ▶ Module importance
- ▶ Intended Learning Outcomes
- ▶ Teaching overview
- ▶ SCIU4T4 Workbook
- ▶ Canvas
- ▶ Assessments
- ▶ Statistical software

Importance of statistical literacy in society

- World increasingly reliant on data and statistics

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- ▶ Statistical analysis is critical in science
- ▶ Statistical literacy is important in modern life

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This module will give you the understanding and skills you need to be statistically literate and do and understand fundamental statistical analyses.

Importance of statistical literacy in society

“Good statistics are like a telescope for an astronomer, a microscope for a bacteriologist, or an X-ray for a radiologist. If we are willing to let them, good statistics help us see things about the world around us and about ourselves – both large and small – that we would not be able to see in any other way”
(Hartford 2020)

¹Hartford, T. 2020. How to make the world add up: ten rules for thinking differently about numbers. Hachette UK.

Importance of statistical literacy as professionals

Journal of Animal Ecology

Bentlage et al. (2025). **Results:**

“At the population level, total rainfall from February to August had a significant quadratic effect on the annual divorce rate, which increased in years with low and high rainfall (GLM, estimate = 0.335 ± 0.091 , p-value = 0.003; Figure S1b). Rainfall effects explained 46.7% of the annual divorce rate's variance ($r^2 = 0.467$).”

¹Bentlage, AA, et al. 2025. Rainfall is associated with divorce in the socially monogamous Seychelles warbler. *Journal of Animal Ecology*. 94:85-98.

Importance of statistical literacy as professionals

Marine Biology

Liu et al. (2025). **Materials and Methods:**

“Experimental data were presented as the mean \pm standard deviation of results obtained from three parallel samples [...]. A one-way analysis of variance (ANOVA) combined with the least significant difference (LSD) method was employed to assess the variance and significance of nutrient content in algal detritus under different environmental conditions (Table 1) ($p < 0.05$).”

¹Liu, Z, et al. 2025. The impact of dissolved oxygen and sediments on the decomposition of *Sargassum thunbergii*. *Marine Biology*, 172:28.

Importance of statistical literacy as professionals

Journal of Environmental Sciences

Tava et al. (2025). **Results:**

“Soil microbial biomass was highly significantly ($P < 0.01$) and positively correlated with alkaline phosphomonoesterase activity in untreated soils (D0, $r_{T03} = 0.92$ and $r_{T14} = 0.77$) and at D01 rate ($r_{T03} = 0.86$ and $r_{T14} = 0.71$) at both time points T03 and T14.”

¹Tava, A, et al. 2025. Saponins in soil, their degradation and effect on soil enzymatic activities. *Journal of Environmental Sciences*, 154:378-389.

Importance of statistical literacy as professionals

Cell

Nishijima et al. (2025). **Methods:**

“To investigate correlations between the microbiome profile (i.e. species-level taxonomic and functional compositions) and the experimentally measured microbial load, Pearson correlation coefficients were calculated between the \log_{10} transformed relative abundance of each microbial species/functions and the microbial load in each cohort separately.”

¹Nishijima, S, et al. 2025. Fecal microbial load is a major determinant of gut microbiome variation and a confounder for disease associations. *Cell*. 188:222-236

Importance of statistical literacy as professionals

Journal of Environmental Geography

Ziti et al. (2025). **Results:**

“The Mann-Kendall trend test shows an increasing, statistically significant ($p = 0.031$, $\alpha = 0.05$) trend in annual mean temperatures between 1969 and 2021 in the sub-catchment, a condition that may contribute to the proliferation of dry conditions in the catchment.”

¹Ziti, C et al. 2025. Climate Change Response Strategies and Implications on Sustainable Development Goals in Mutirikwi River Sub-Catchment of Zimbabwe. *Journal of Environmental Geography*, 17:1-14.

Importance of statistical literacy as professionals

Frontiers in Education

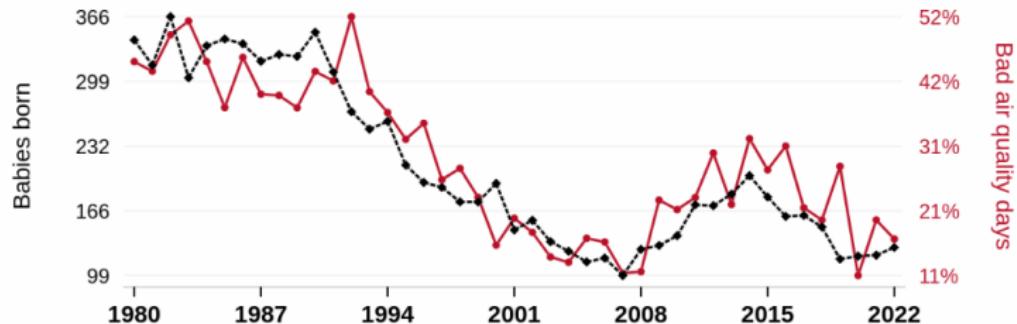
Naim et al. (2025). **Methods:**

“The study uses multiple linear regression analysis to examine the relationship between independent variables (socioeconomic status, funding per student, teacher-student ratio, availability of advanced coursework, tuition fees, scholarship availability, and diversity of the student body) and dependent variables (test scores, graduation rates, enrolment statistics, and post-graduation employment rates).”

¹Naim, A. 2025. Equity Across the Educational Spectrum: Innovations in Educational Access Crosswise all Levels. *Frontiers in Education* 9:1499642

Statistical literacy is important

Popularity of the first name Gerard correlates with Air pollution in Anchorage



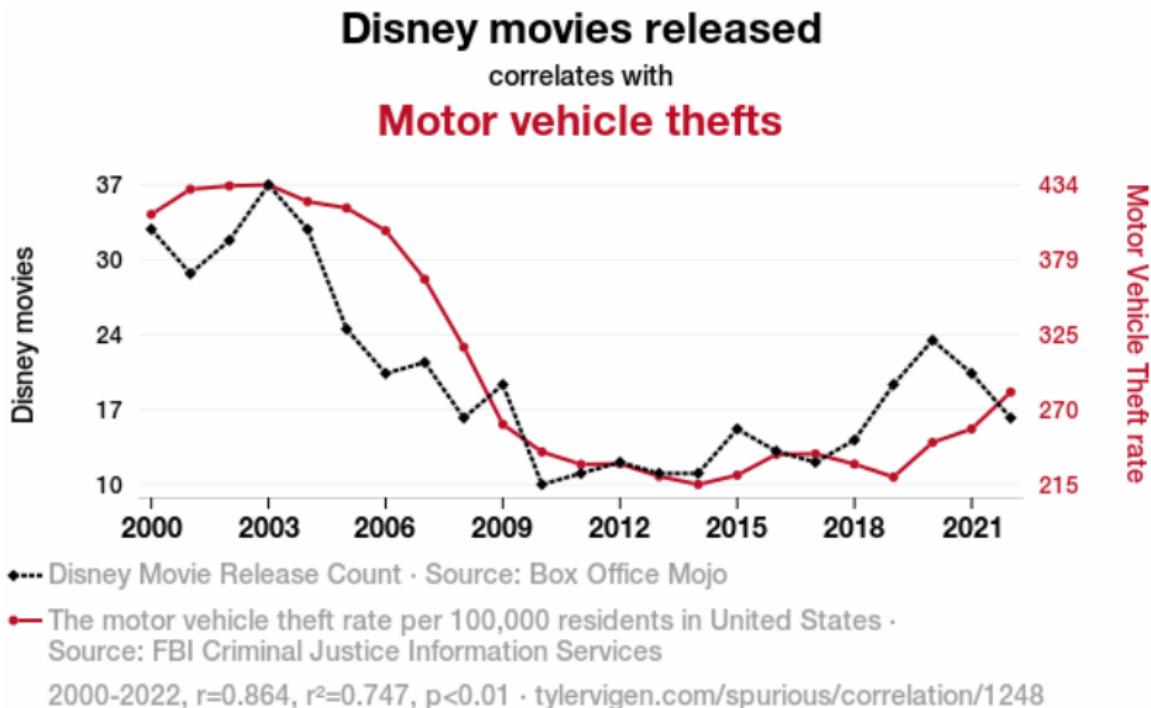
●--- Babies of all sexes born in the US named Gerard · Source: US Social Security Administration

● Percentage of days with moderate or worse air quality in Anchorage, AK · Source: Environmental Protection Agency

1980-2022, $r=0.893$, $r^2=0.797$, $p<0.01$ · [tylervigen.com/spurious/correlation/2018](https://www.tylervigen.com/spurious/correlation/2018)

¹Vigen, Tyler. 2025. Spurious correlations: Accessed 19 JAN 2025
(CC-BY-4.0) <https://www.tylervigen.com/spurious-correlations>

Statistical literacy is important



¹Vigen, Tyler. 2026. Spurious correlations: Accessed 06 JAN 2026
(CC-BY-4.0) <https://www.tylervigen.com/spurious-correlations>

Statistical literacy is important

ChatGPT Explanation:

As Disney downshifted its movie production, there were fewer car-related films and spin-off merchandise, leading to a reduced interest in automobiles. This eventually put the brakes on the demand for stolen cars, steering would-be thieves towards other, non-automotive pursuits.

¹Vigen, Tyler. 2026. Spurious correlations: Accessed 6 JAN 2026
(CC-BY-4.0) <https://www.tylervigen.com/spurious-correlations>

Statistical literacy is important

Journal of Quirky Criminology
2024, Vol. 209, No. 8, 818-840

Copyleft 2024 by The Institute for Cultural Impact Research and Analysis
S7666-5444(1248)6790-2 DOI: 14.4061/262775728016

The Lion Car King: An Empirical Study of the Relationship Between Disney Movie Releases and Motor Vehicle Thefts

Claire Hamilton, Andrew Travis, Giselle P Tate

International Research College

In this research paper, we delve into the enchanting world of Disney movies and their potential impact on the occurrence of motor vehicle thefts. Leveraging data from Box Office Mojo and the FBI Criminal Justice Information Services, our study covers the period from 2000 to 2022. Our findings reveal a remarkably high correlation coefficient of 0.8641449 and a statistically significant p-value of less than 0.01, indicating a strong relationship between the release of Disney movies and motor vehicle thefts. Through rigorous statistical analysis and whimsical data visualization, we present compelling evidence for the connection between the magic of Disney films and the unfortunate increase in auto "disappearances." This study not only sheds light on this peculiar association but also brings forth a lighthearted perspective to the realm of criminology. So, embrace yourself for a magical ride through the world of empirical research, where "happily ever after" might come with a side of car troubles.

The relationship between popular culture and criminal behavior has been the subject of considerable academic inquiry in recent years. While previous studies have examined the impact of socioeconomic factors, demographic shifts, and law enforcement strategies on crime rates, the potential influence of cultural phenomena, particularly the release of Disney movies, has remained relatively unexplored. In this study, we set out to investigate whether there exists a significant correlation between the debut of Disney cinematic creations and the incidence of motor vehicle thefts across the United States.

popular culture. So, fasten your seat belts, and prepare for a scholarly journey that promises to be as entertaining as it is enlightening. After all, in the words of a certain iconic mouse, "Oh, boy!" It's time to unravel the magic behind the wheel, where statistical significance meets the circle of cinematic life.

Review of existing research

The literature surrounding the intersection of Disney movies and

¹Vigen, Tyler. 2026. Spurious correlations: Accessed 6 JAN 2026
(CC-BY-4.0) <https://www.tylervigen.com/spurious-correlations>

Intended Learning Outcomes (ILOS)

- (1) Manipulate datasets and characterise their statistical properties.

Intended Learning Outcomes (ILOS)

(2) Demonstrate an understanding of null hypothesis testing.

Intended Learning Outcomes (ILOS)

- (3) Choose and apply the correct statistical test to unseen data using statistical software.

Intended Learning Outcomes (ILOS)

- (4) Interpret the results of statistical tests in order to generate conclusive statements on scientific problems.

Teaching overview

Online	Face-to-face
Book chapters	Lectures
Quizzes	Practicals
	Optional help

Face-to-face teaching

Lectures:

- ▶ Logie LT (MON 11:00-12:00)
- ▶ Cottrell LT A4 (WED 09:00-10:00)

Face-to-face teaching

Lectures:

- ▶ Logie LT (MON 11:00-12:00)
- ▶ Cottrell LT A4 (WED 09:00-10:00)

Practical: Cottrell 2A15

- ▶ Group A: WED 11:00-14:00
- ▶ Group B: THU 09:00-12:00

Face-to-face teaching

Lectures:

- ▶ Logie LT (MON 11:00-12:00)
- ▶ Cottrell LT A4 (WED 09:00-10:00)

Practical: Cottrell 2A15

- ▶ Group A: WED 11:00-14:00
- ▶ Group B: THU 09:00-12:00

Optional Help:

- ▶ Cottrell 1A11 (FRI 11:00-13:00)

SCIU4T4 Workbook: How to use it

- ▶ HTML and MP3
- ▶ All required reading
- ▶ All practicals
- ▶ Links to all content

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<https://bradduthie.github.io/SCIU4T4/>

Online workbook accessible

Audiobook is on Canvas (Panopto, Spotify)

Canvas: How to navigate and important pages

- ▶ Links to SCIU4T4 Workbook
- ▶ Learning and teaching
- ▶ Lectures (desk, theatre)
- ▶ Practice quizzes
- ▶ Discussions

Assessment

- ▶ Weekly practice quizzes
- ▶ Ad hoc practice problems

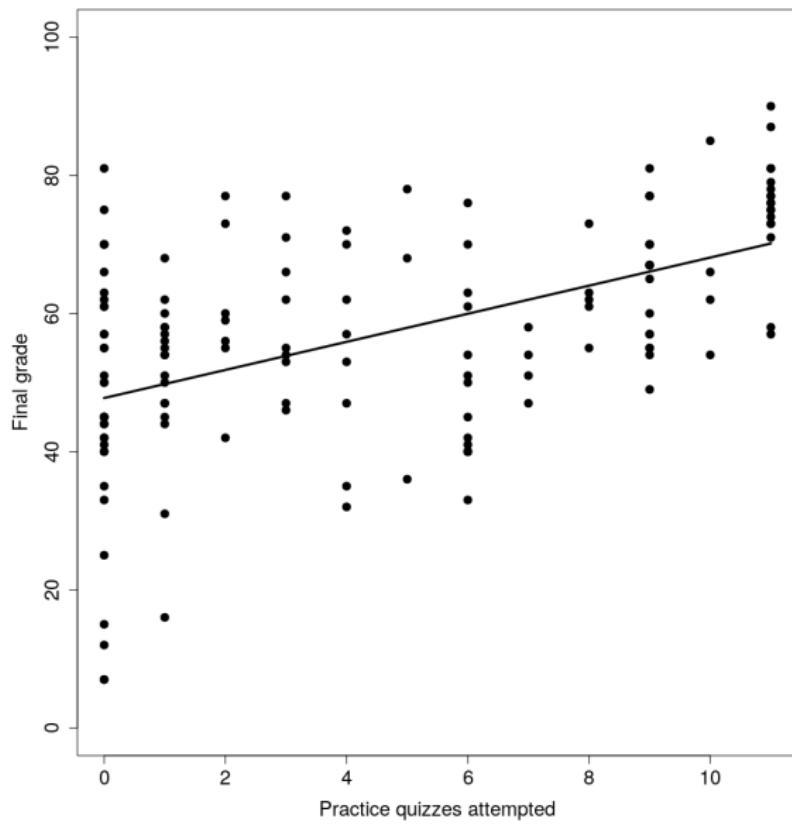
Assessment

- ▶ Weekly practice quizzes
- ▶ Ad hoc practice problems
- ▶ 1 Formative test
- ▶ 2 Summative tests

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- ▶ Weekly practice quizzes
- ▶ Ad hoc practice problems
- ▶ 1 Formative test
- ▶ 2 Summative tests
- ▶ 1 Formative Exam
- ▶ 1 Summative Exam

Assessment



Assessment

- ▶ Completed on Canvas
- ▶ Open book and note
- ▶ Must work independently
- ▶ Evaluating your learning
- ▶ Common Marking Scheme

Assessment

Three types of questions

1. Fundamental (at least 50%)

Assessment

Three types of questions

1. Fundamental (at least 50%)
2. Conceptual (at least 30%)

Assessment

Three types of questions

1. Fundamental (at least 50%)
2. Conceptual (at least 30%)
3. Advanced (no more than 20%)

Types will be clearly indicated

Assessment

Three types of questions

1. Fundamental (at least 50%)
2. Conceptual (at least 30%)
3. Advanced (no more than 20%)

Types will be clearly indicated

Detailed feedback (10+ pages) on tests

Statistical software

- ▶ Spreadsheets (any)
 - ▶ MS Excel
 - ▶ LibreOffice Calc
 - ▶ Google Sheets

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 - ▶ MS Excel
 - ▶ LibreOffice Calc
 - ▶ Google Sheets
- ▶ jamovi
 - ▶ Free and open-source
 - ▶ Windows, Mac, Linux, Chrome
 - ▶ Easy transition to R