

Some thoughts on R in integRity

Richard Gill

Mathematical Institute, Leiden University

What I like about R

- Disciplined anarchy
- The community
- It's fun!

What I like about science

- Disciplined anarchy
- The community
- It's fun!

The R Inferno

Patrick Burns



Abstract: If you are using R and you think you're in hell, this is a map for you.



WANDERED through

<http://www.r-project.org>.

To state the good I found there, I'll also say what else I saw.

The Nine Circles of Scientific Hell

Neuroskeptic¹

In the spirit of Dante Alighieri's *Inferno*, this paper takes a humorous look at the fate that awaits scientists who sin against best practice.

The *Divine Comedy* of Dante Alighieri is a classic of world literature and was the first major work in the Italian language. In the first book of the trilogy, *Inferno*, Dante offers a tour of the nine increasingly horrible levels of Hell, in which the wicked are tormented forever in ways corresponding to their sins. But Dante lived before the era of modern science. Perhaps it is necessary to update his scheme to explain what happens to those guilty of various scientific sins, ranging from the commonplace to the shocking (see Fig. 1.).

Dante's Hell had a place for everyone, and it was only Christ's intervention that saved anyone from it; even "good" people went to Hell, because everyone sinned, and sins were still sins however ubiquitous they were. Likewise, very few scientists (the author is certainly not one of them) would be able to avoid being condemned to some level of this Inferno... but is that an excuse?

First Circle: Limbo

The uppermost circle is not a place of punishment so much as regret. Those who have committed no scientific sins per se, but

Fourth Circle: p Value Fishing

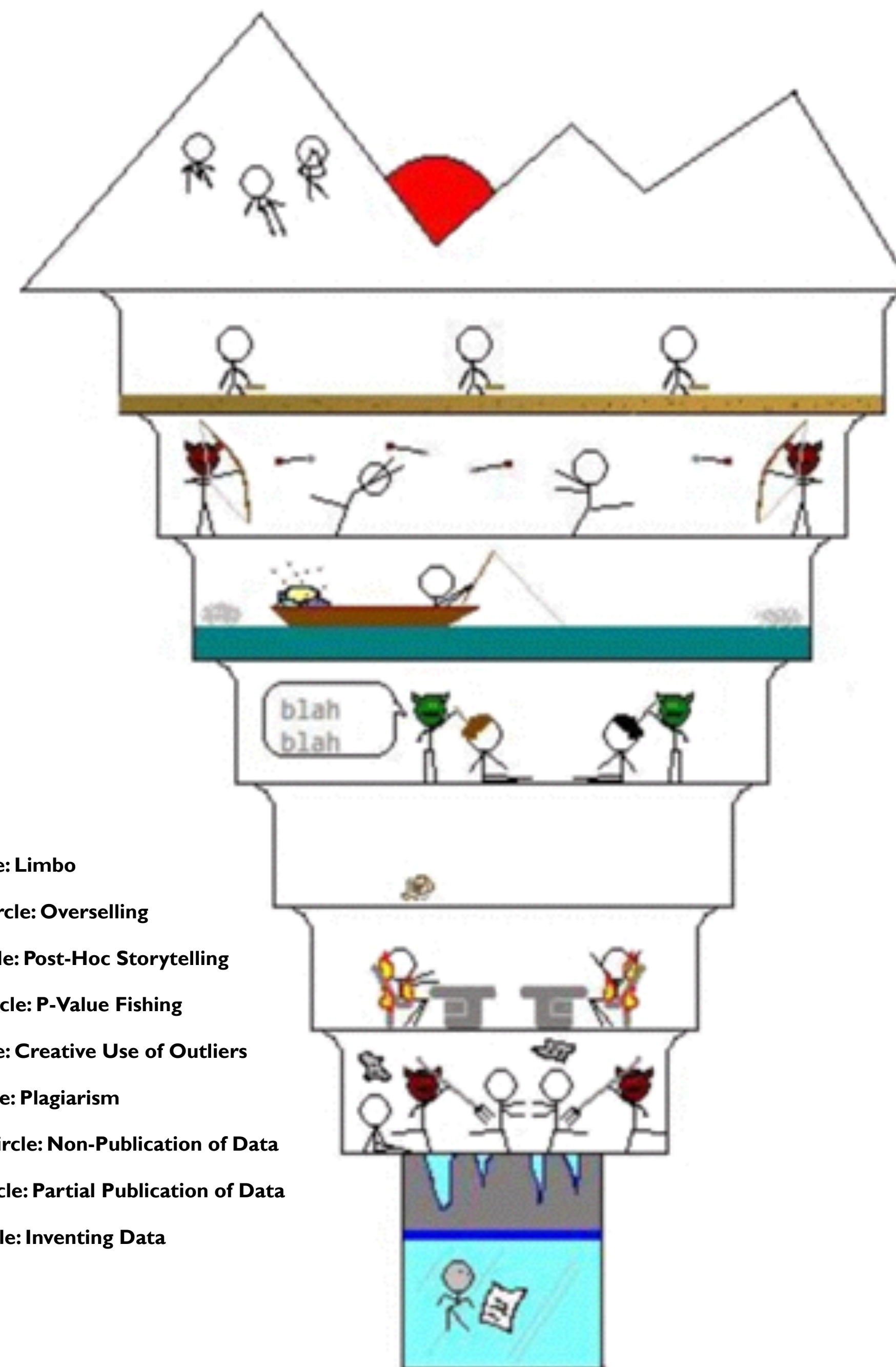
Those who tried every statistical test in the book until they got a p value less than .05 find themselves here, in an enormous lake of murky water. Sinners sit on boats and must fish for their food. Fortunately, they have a huge selection of different fishing rods and nets (brand names include Bayes, Student, Spearman, and many more). Unfortunately, only one in 20 fish are edible, so the sinners in this circle are constantly hungry.

Fifth Circle: Creative Use of Outliers

Those who "cleaned up" their results by excluding inconvenient data points are condemned here. Demons pluck out their hairs one by one, each time explaining that the sinner is better off without that hair, because there was something wrong with it.

Sixth Circle: Plagiarism

This circle is empty because as soon as sinners arrive, a demon carries them to another circle and forces them to suffer the punishment meted out to the people there. After their 3-year "post" is up, they are carried to another circle, and so on...



First Circle: Limbo

Second Circle: Overselling

Third Circle: Post-Hoc Storytelling

Fourth Circle: P-Value Fishing

Fifth Circle: Creative Use of Outliers

Sixth Circle: Plagiarism

Seventh Circle: Non-Publication of Data

Eighth Circle: Partial Publication of Data

Ninth Circle: Inventing Data

Some recent adventures

- We must distinguish between the integrity of a scientific work and the integrity of a scientific worker
- The worker is innocent till proven guilty (human dignity, respect ...)
- The work is up there, to be torn apart if in any way possible

Integrity Investigations

- Investigating the worker: confidential, private (a matter between an employer and an employee)
- Investigating the work: public (scientific discourse is the original crowd-sourcing)

The organisations always get it wrong

- The corporate approach to damage control almost always causes untold extra damage
- Lawyers and managers have no clue about the science

PERSPECTIVE

Beyond Bar and Line Graphs: Time for a New Data Presentation Paradigm

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 OPEN ACCESS

Citation: Weissgerber TL, Milic NM, Winham SJ, Garovic VD (2015) Beyond Bar and Line Graphs: Time for a New Data Presentation Paradigm. *PLoS Biol* 13(4): e1002128. doi:10.1371/journal.pbio.1002128

Published: April 22, 2015

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Abstract

Figures in scientific publications are critically important because they often show the data supporting key findings. Our systematic review of research articles published in top physiology journals ($n = 703$) suggests that, as scientists, we urgently need to change our practices for presenting continuous data in small sample size studies. Papers rarely included scatterplots, box plots, and histograms that allow readers to critically evaluate continuous data. Most papers presented continuous data in bar and line graphs. This is problematic, as many different data distributions can lead to the same bar or line graph. The full data may suggest different conclusions from the summary statistics. We recommend training investigators in data presentation, encouraging a more complete presentation of data, and changing journal editorial policies. Investigators can quickly make univariate scatterplots for small sample size studies using our Excel templates.

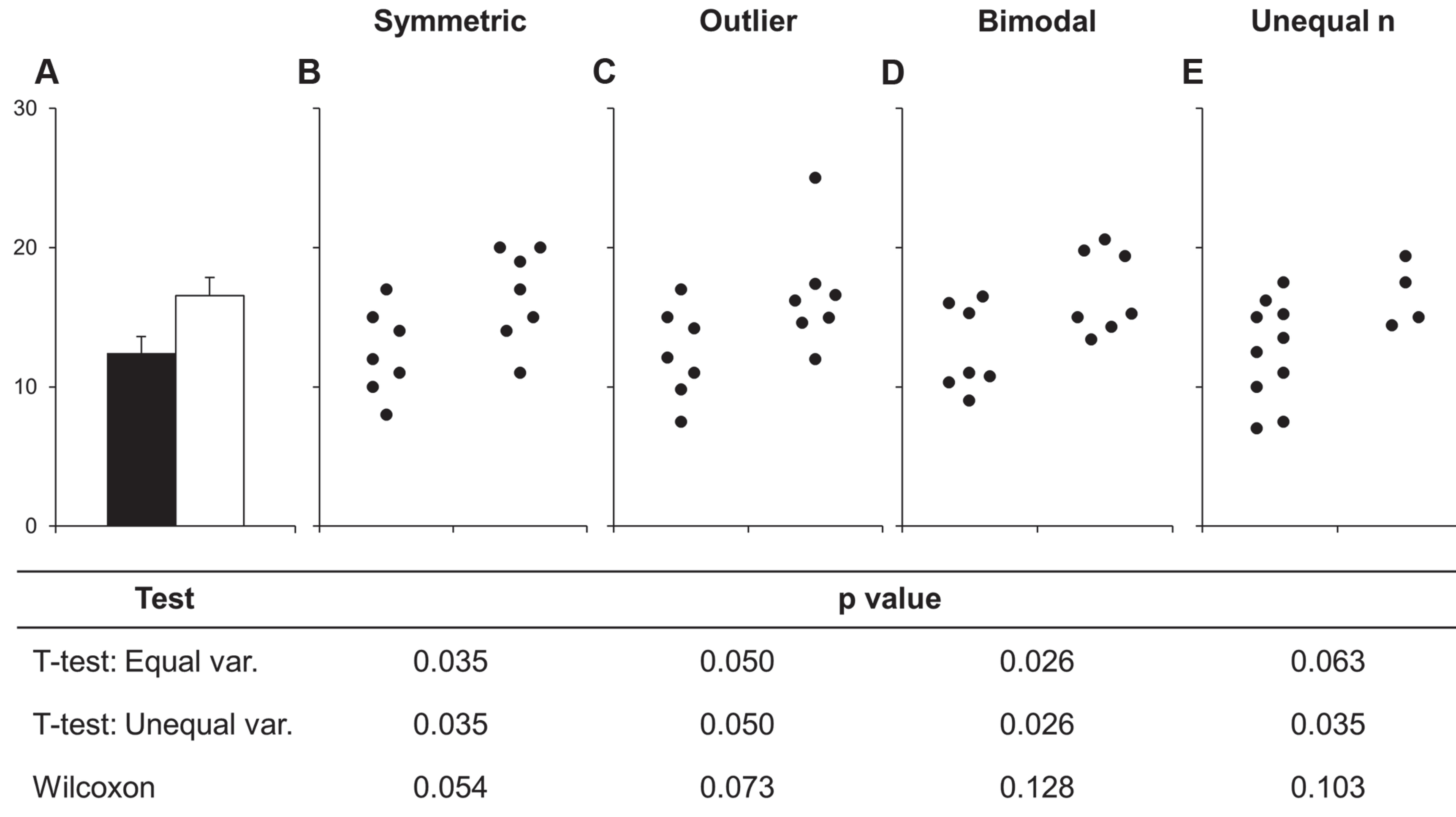


Fig 1. Many different datasets can lead to the same bar graph. The full data may suggest different conclusions from the summary statistics. The means and SEs for the four example datasets shown in Panels B–E are all within 0.5 units of the means and SEs shown in the bar graph (Panel A). *p*-values were calculated in R (version 3.0.3) using an unpaired t-test, an unpaired t-test with Welch’s correction for unequal variances, or a Wilcoxon rank sum test. In Panel B, the distribution in both groups appears symmetric. Although the data suggest a small difference between groups, there is substantial overlap between groups. In Panel C, the apparent difference between groups is driven by an outlier. Panel D suggests a possible bimodal distribution. Additional data are needed to confirm that the distribution is bimodal and to determine whether this effect is explained by a covariate. In Panel E, the smaller range of values in group two may simply be due to the fact that there are only three observations. Additional data for group two would be needed to determine whether the groups are actually different.

Weissberger et al

- People use bar-charts because they are in Excel
- People use bar-charts because they are in SPSS
- Only programmers / statisticians can use R

<https://pubpeer.com/publications/88FDF1702D12B6237F437DCA47E43A>

PubPeer > PLoS Biol

"Beyond Bar and Line Graphs: Time for a New Data Presentation Paradigm"

Tracey L. Weissgerber, Natasa M. Milic, Stacey J. Winham, Vesna D. Garovic, PLoS Biol (2015)

Comments (17):

Peer 2: (April 25th, 2015 10:54am UTC)

0

This paper is a very important contribution on how to improve the way we present statistical data. The reception of this paper has been quite astounding with over 39,000 visits on Plos biology website since 22 April. Astonishingly, my tweet on this paper (<https://twitter.com/GaetanBurgio/status/59095804244480001>) has attracted > 300 Retweets, > 300 favorites and over 30,000 impressions. Additionally, today a comment on this paper has been featured in Nature News and comments (<http://www.nature.com/news/bar-graphs-criticized-for-misrepresenting-data-1.17383>), which start trending strongly on Twitter. This response to this paper underlines the widespread of bad habits in statistics and data representation. I would like to take this unexpected opportunity to share a summary of my discussions on Twitter on this paper and my personal take on this story. Hopefully we can start an interesting and fruitful discussion on this forum. For once, it won't be on data manipulation and paper retraction!

I would like to make two general comments.

Firstly, bad statistics and bad habits are widespread and common throughout Science, especially in biological sciences. It undermines the reproducibility of the data and experiments. This leads to a waste of public funds and time to reproduce experiments. This can be expressed in various forms amongst small samples sizes, P.hacking (<http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1002106>) or cherry-picking data. How many times I reviewed papers with ridiculously low sample size or cherry-picking data. I don't really think I need to convince the readers

- Go to Article PDF
- ★ Stop alerts for new activity
- 👤 Sign my posts on this thread
- ✉ Invite others to the conversation

External links

Popular press (1)

- Bar graphs criticized for misrepresenting data

Blogs (3)

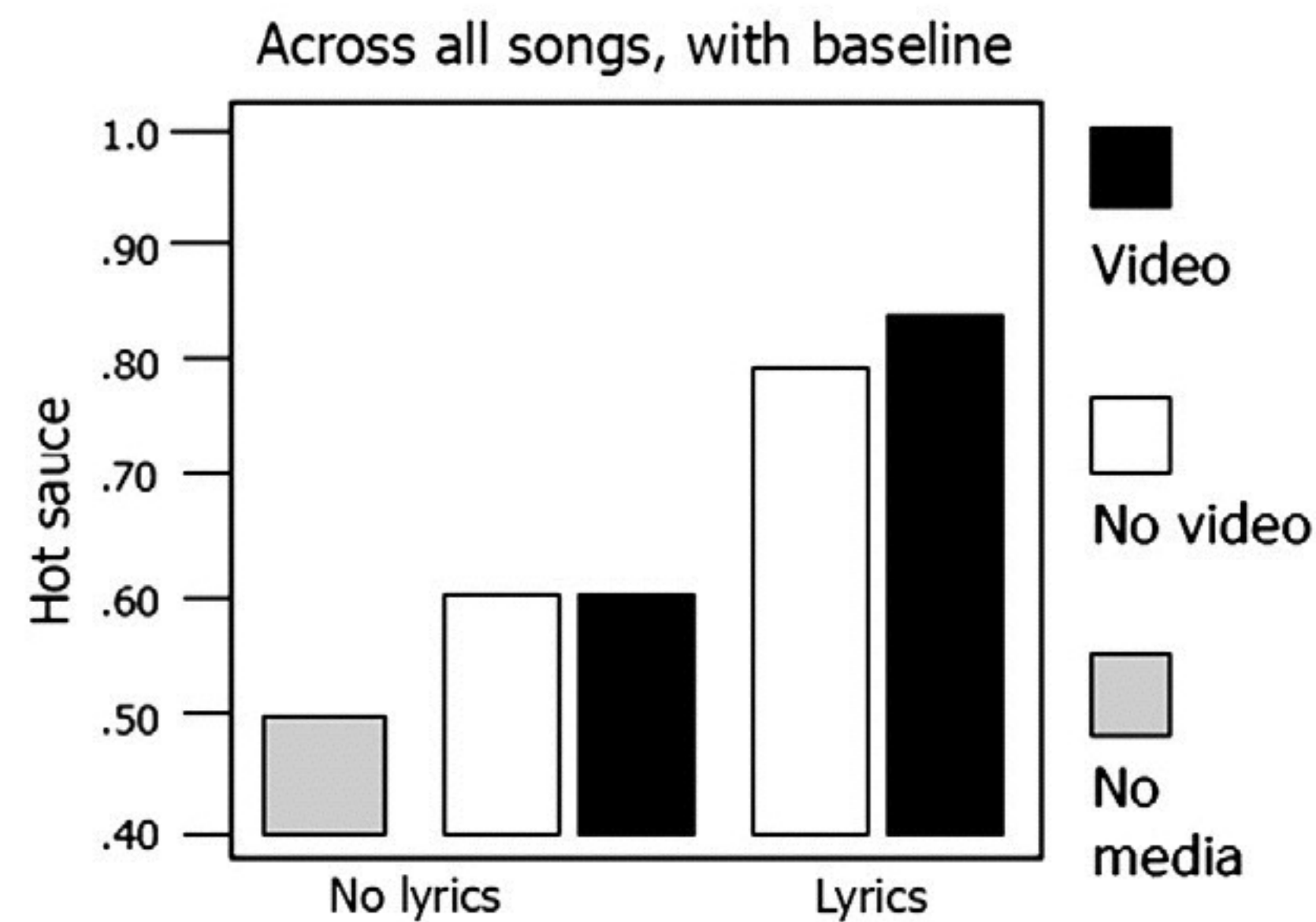
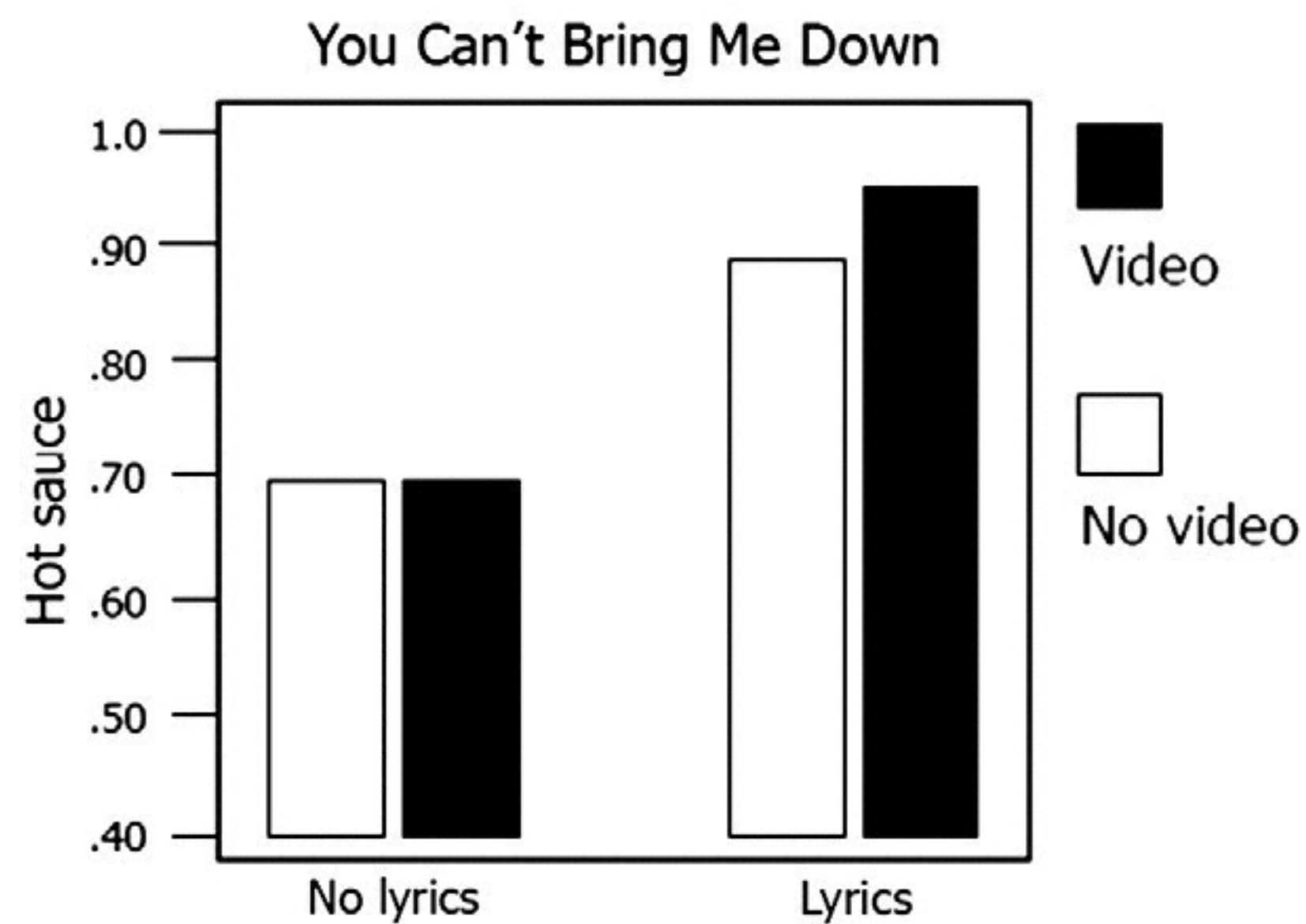
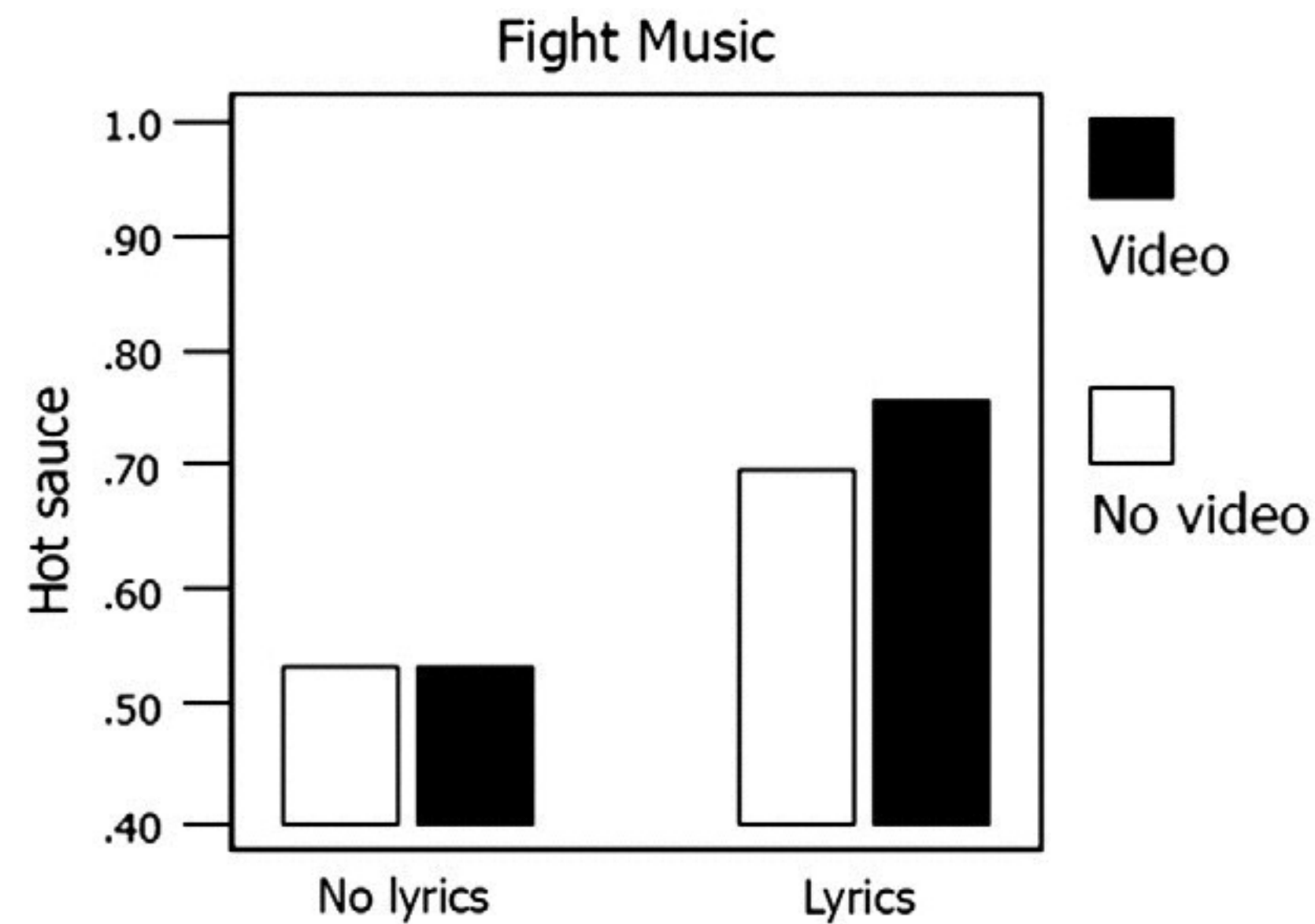
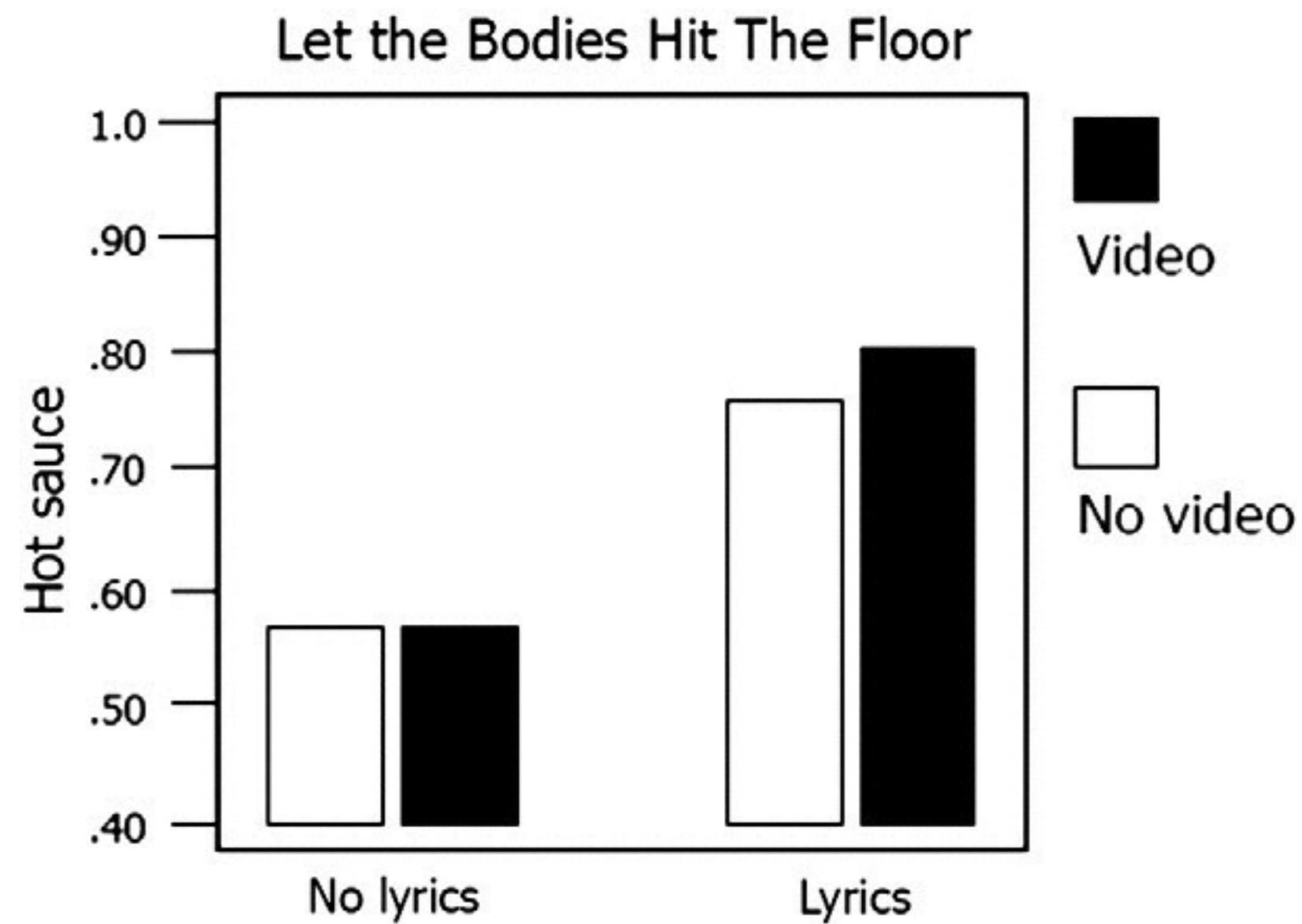
- Recommended Reads #51
- Link roundup for April 2015
- Link roundup for May 2015

Google Plus (4)

- PLOS Biology: Beyond Bar and Line Graphs: Time for a New Data Presentation Paradigm via Alberto Cairo...
- "Beyond Bar and Line Graphs: Time for

feedback

Hot chili sauce





Contents lists available at ScienceDirect

Journal of Experimental Social Psychology

journal homepage: www.elsevier.com/locate/jesp



Reports

The effect of auditory versus visual violent media exposure on aggressive behaviour: The role of song lyrics, video clips and musical tone

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ARTICLE INFO

Article history:

Received 10 November 2010

Available online 19 February 2011

Keywords:

Violent music video clips

Violent song lyrics

Aggression

ABSTRACT

Five decades of research have shown clear links between exposure to violent visual media and subsequent aggression, however there has been little research that directly compares the effects of exposure to violent visual versus auditory media, or which has experimentally tested the effect of violent song lyrics with musical ‘tone’ held constant. In the current study 194 participants heard music either with or without lyrics, and with or without a violent music video, and were then given the chance to aggress using the hot sauce paradigm. Musical tone was held constant across groups, and a fifth (control) group had no media exposure at all. Experimental groups, on average, were significantly more aggressive than controls. The strongest effect was elicited by exposure to violent lyrics, regardless of whether violent imagery accompanied the music, and regardless of various person-based characteristics. Implications for theories of media violence and models of aggression are discussed.

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Introduction

More than fifty years of research have produced evidence suggesting that violent visual media exposure has causal links with aggressive behaviour, desensitisation to violence and hostile thinking (Anderson, Berkowitz, et al., 2003; Bushman & Anderson, 2009; Bushman & Huesmann, 2006; Strasburger, Wilson, & Jordan, 2009).

(2003) demonstrated that violent lyrics elicited aggressive thoughts and feelings across a number of studies and musical genres. Fischer and Greitemeyer (2006) found that sexually aggressive/misogynistic song lyrics increased aggression towards women among male participants, even when controlling for musical tone. Warburton et al. (2008) found a positive correlation between violent song lyrics and recent acts of physical and indirect aggression. In contrast a

Exercise: find this on PubPeer



- I wrote to the authors asking for the data
- Requests for data and information ignored for four weeks
- At last, MacQuarie University “integrity officer” informs me that authors are forbidden to send me their data
- Results of confidential investigation will perhaps be sent to journal editor ...
- I wrote to journal editors ...

Now closer to home ...

Dirk Smeesters, Jia Liu (2011). *Journal of Experimental Social Psychology* 47, 653–656
The effect of color (red versus blue) on assimilation versus contrast in prime-to-behavior effects.



**Paper includes table
with means, sd's, n's**

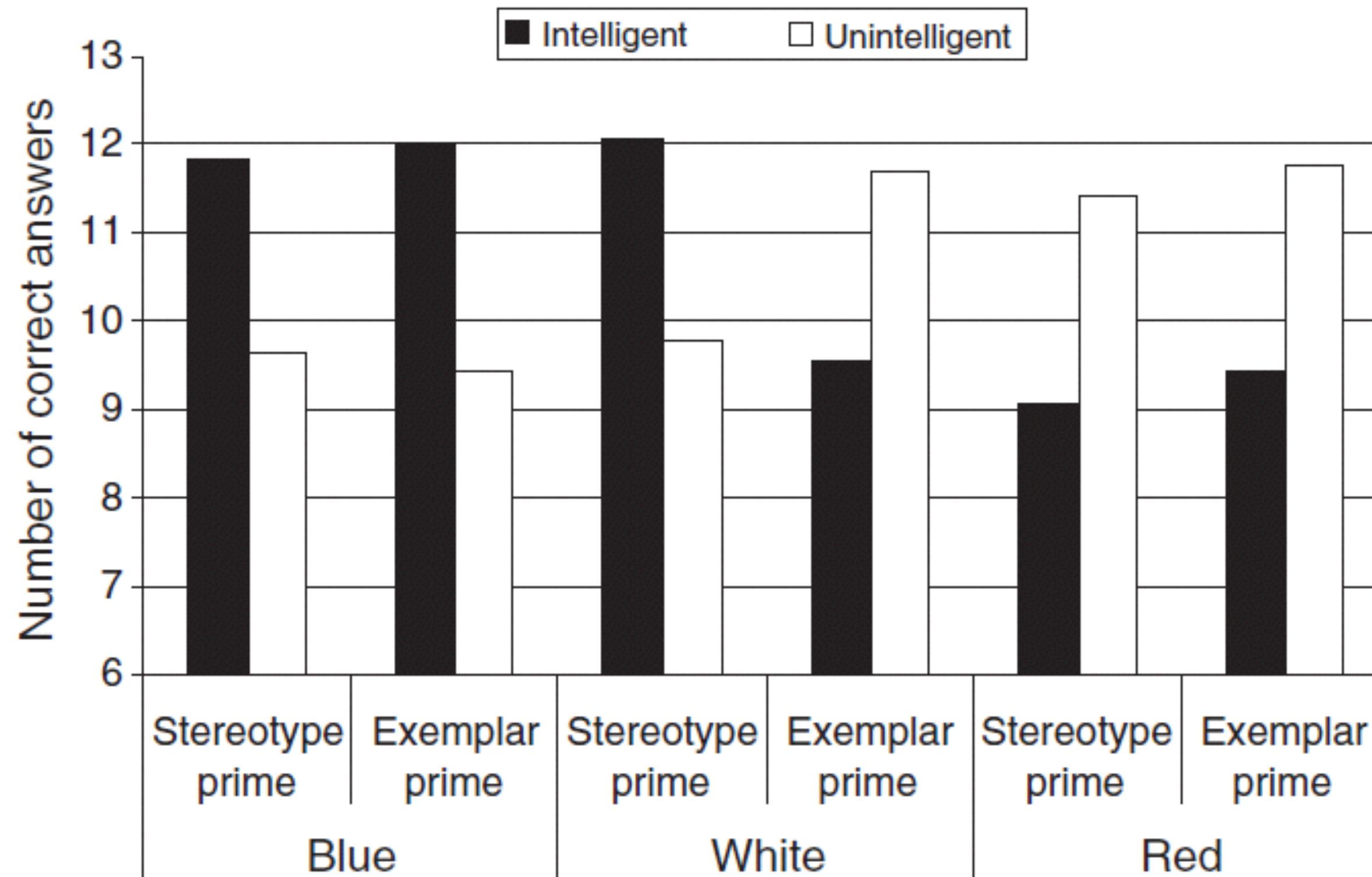
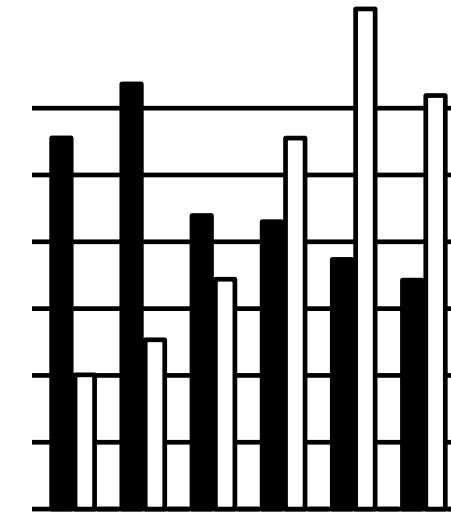
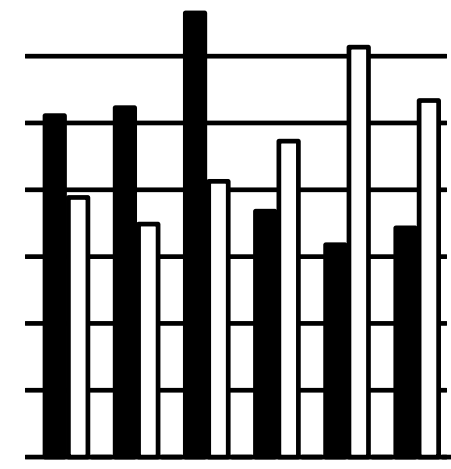
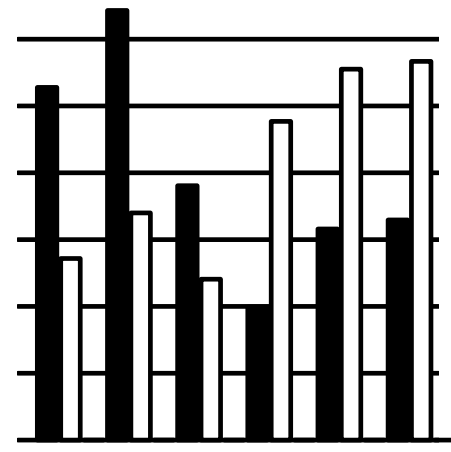
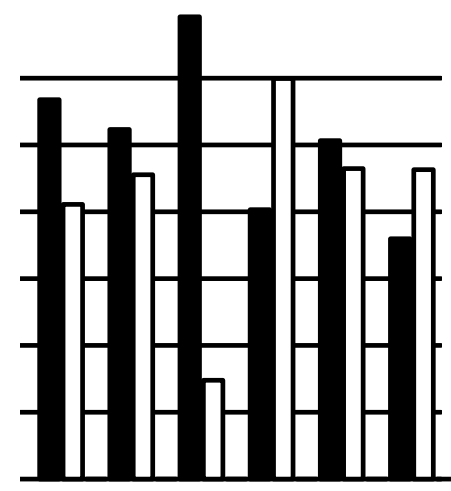
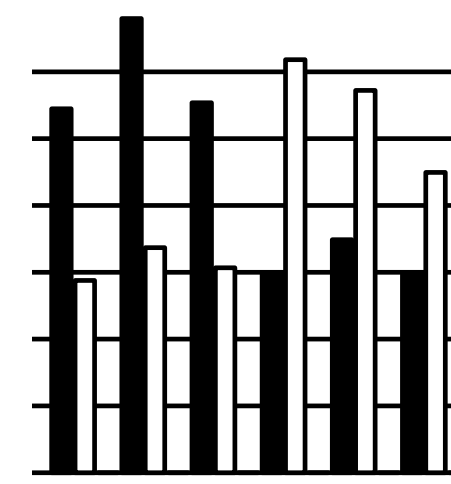
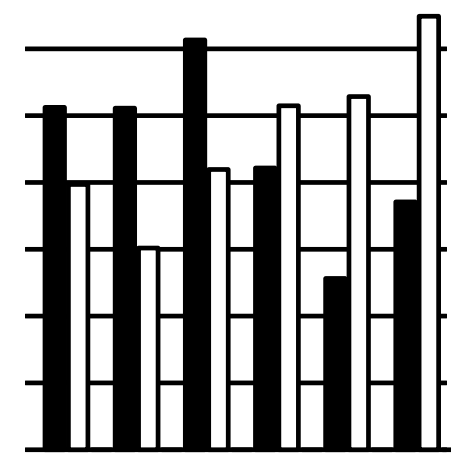
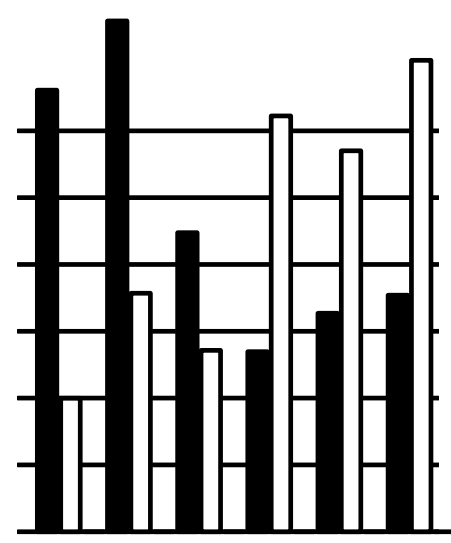
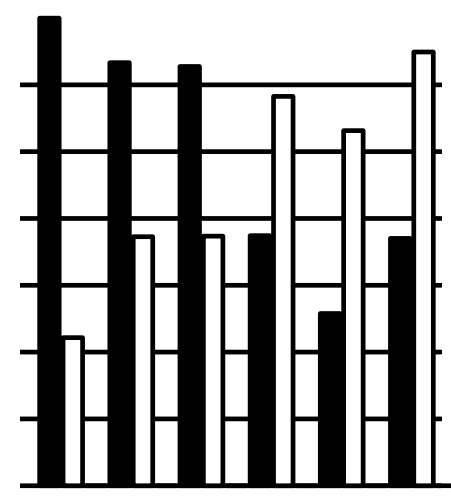
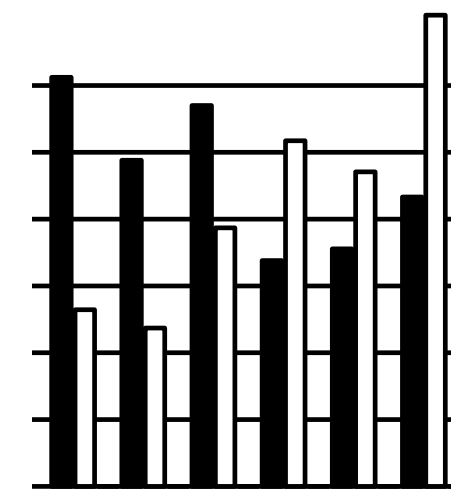
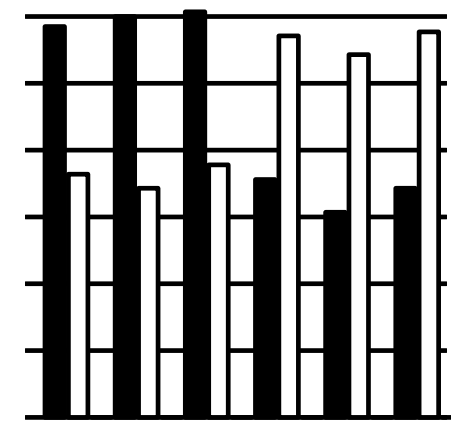
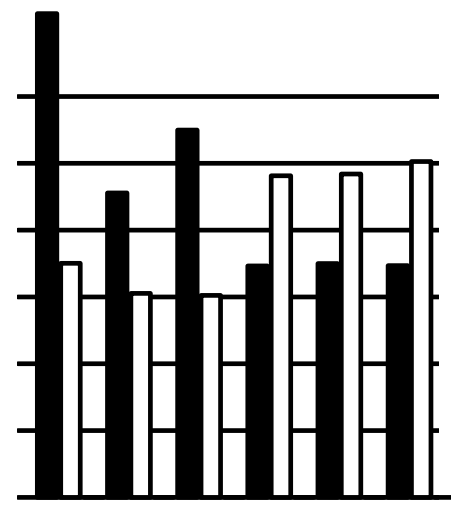
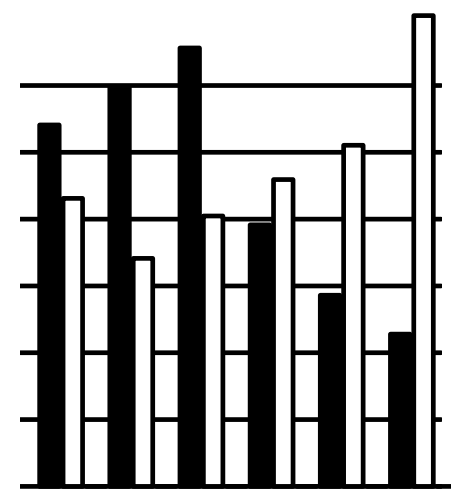
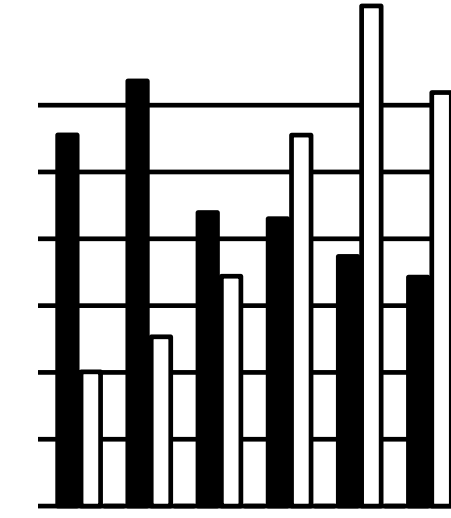
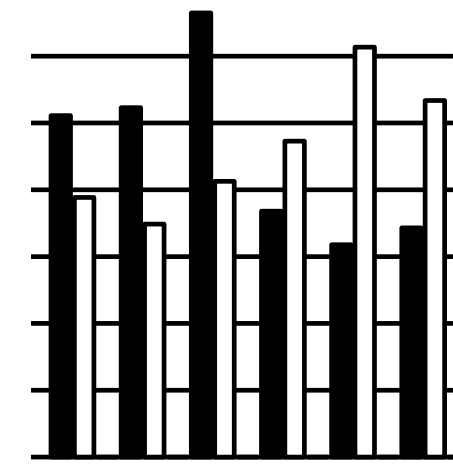
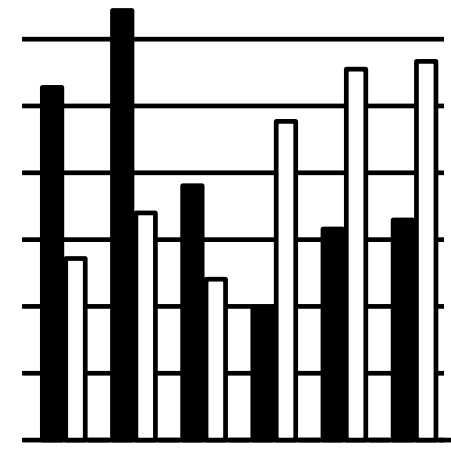
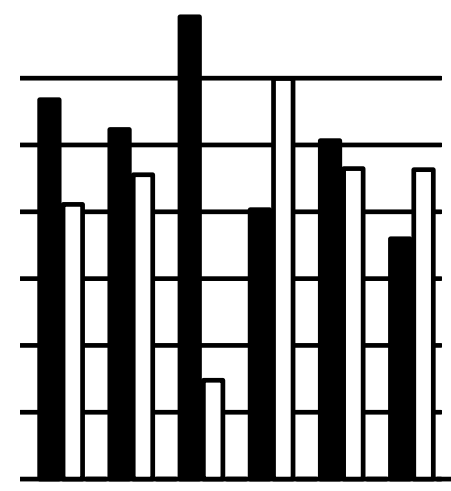


Fig. 1. Number of correct answers as a function of color, prime, and dimension.

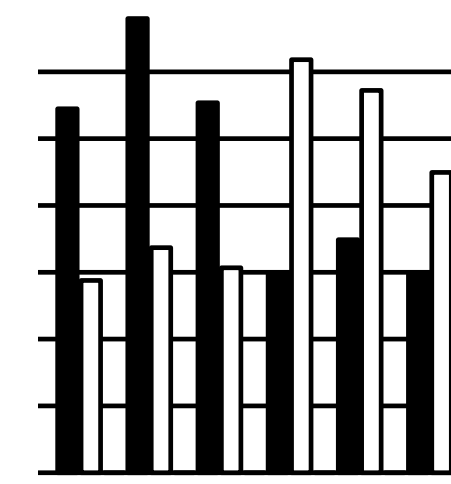
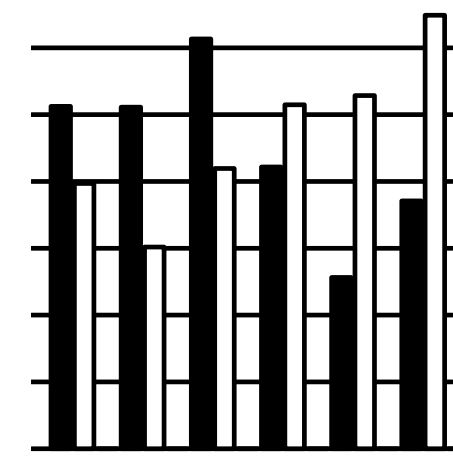
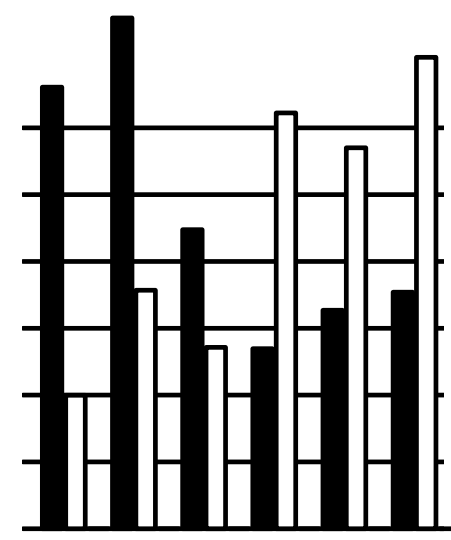
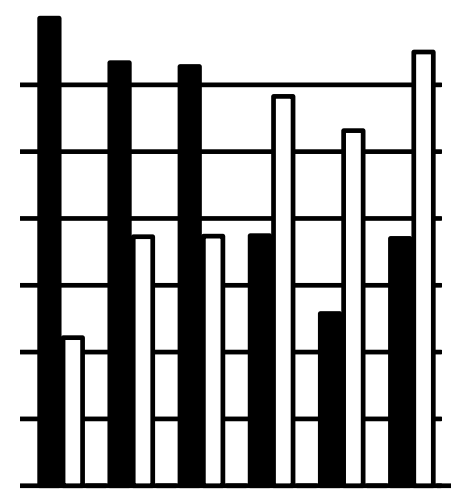
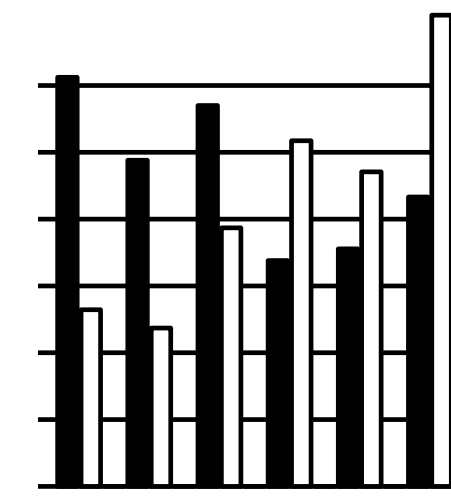
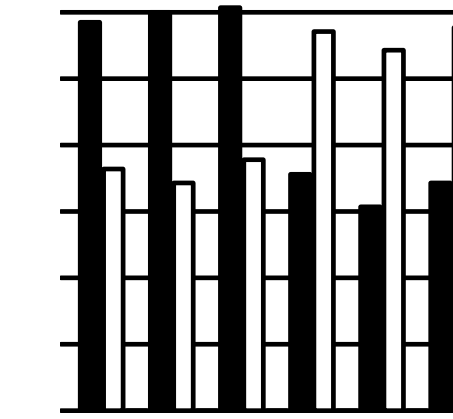
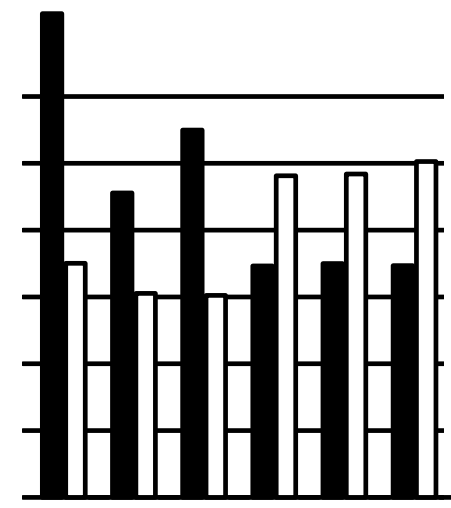
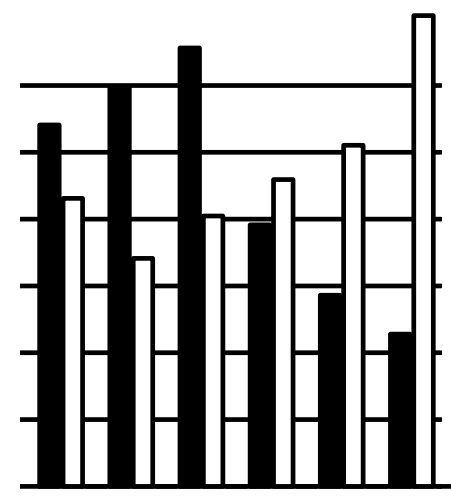


Spot the odd one out!





Spot the odd one out!



Statistical Analyses

- ANOVA F-tests, rejecting for *small* values of the statistic (*R.A. Fisher* test of “too good to be true”)
- Validate / calibrate with bootstrap (parametric or semi-parametric) or permutation tests
- Combination of many tests: *R.A. Fisher* combination method



Anonymous whistleblower later identified to be Uri Simonsohn



Aside, on R.A. Fisher

- Fisher knew the counter-examples to his theorem that maximum likelihood was asymptotically optimal
- The knowledge was suppressed: it would confuse the faithful



Statistical Priesthood II

Sir Ronald on Scientific Inference *

door Prof. Dr D. van Dantzig

Samenvatting

Ter gelegenheid van het verschijnen van Sir Ronald Fisher's nieuwste boek¹⁾ wordt een kritische beschouwing gegeven van zijn aannemelijkheidstheorie en de theorie van „fiducial inference”. Wat de laatste betreft wordt geconstateerd, dat deze theorie, in de vorm waarin zij door Fisher gegeven wordt, fouten bevat, hoewel een interpretatie mogelijk is, die in overeenstemming schijnt te zijn met Fisher's ideeën en die een wiskundig correcte behandeling mogelijk maakt. Daartoe is een duidelijk onderscheid, ook in notatie, nodig tussen stochastische grootheden en getallen. De hier gegeven definitie van stochastische grootheden, die Fisher's fiduciële verdelingen bezitten, kan wellicht een gemeenschappelijke basis vormen, waarop aanhangers en tegenstanders van Fisher's ideeën tot een beter wederzijds begrip kunnen komen. Een gedeelte van Fisher's methoden en resultaten kan eveneens gerechtvaardigd worden en „fiducial inference” neemt dan het karakter aan van een eliminatie-methode voor onbekende parameters. Als zodanig heeft deze theorie ongetwijfeld verdiensten, maar het gebied van toepassing is nogal beperkt. Dezelfde resultaten kunnen echter ook bereikt worden langs andere weg, in het bijzonder met behulp van de theorie van betrouwbaarheidsgrenzen.

Bij andere toepassingen echter, die niet gedekt worden door de theorie van Neyman en Pearson, in het bijzonder bij de toets van Behrens-Fisher, heeft de verwarring van stochastische grootheden en getallen tot onherstelbare fouten geleid. Ondanks alle pogingen, Fisher's dikwijls onduidelijke verklaringen in overeenstemming met zijn filosofische gedachtengang te interpreteren, kan geen rechtvaardiging voor deze toepassingen gevonden worden. Daar vroegere kritiek van andere schrijvers geldig blijft, kan er geen twijfel meer bestaan, dat deze toepassing fout is.

Summary

Partly as a critical review of Sir Ronald Fisher's latest book, partly as an essay, Fisher's theory of likelihood and fiducial inference is carefully considered. As to the latter, it is found that in the form presented it contains

*) Report SP 59 of the Statistical Department of Het Mathematisch Centrum, Amsterdam.

¹⁾ “Statistical Methods and Scientific Inference”, Oliver and Boyd, Edinburgh and London 1956, pp. 175, 16 /—.





Geraerts / Merckelbach



Brief Report

MEMORY, 2008, 16 (1), 22–28

 Psychology Press
Taylor & Francis Group

Reduced Meta-Consciousness of Intrusions as an Explanation for Recovered Memory Reports

Elke Geraerts^{1,2*}, Richard J. McNally³, Harald Merckelbach², Anne-Laura van Harmelen⁴,
Linsey Raymaekers², & Jonathan W. Schooler⁵

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³Department of Psychology, Harvard University, United States of America

⁴Department of Psychology, Leiden University, The Netherlands

⁵Department of Psychology, University of California, Santa Barbara, United States of America

Linking thought suppression and recovered memories of childhood sexual abuse

Elke Geraerts

Maastricht University, the Netherlands, and Harvard University, Cambridge, MA, USA

Richard J. McNally

Harvard University, Cambridge, MA, USA

Marko Jelicic, Harald Merckelbach, and Linsey Raymaekers

Maastricht University, the Netherlands

Word Count: 3.404

There are two types of recovered memories: those that gradually return in recovered memory therapy and those that are spontaneously recovered outside the context of therapy. In the current study, we employed a thought suppression paradigm, with autobiographical experiences as target thoughts, to test whether individuals reporting spontaneously recovered memories of childhood sexual abuse (CSA) are more adept at suppressing positive and anxious autobiographical thoughts, relative to individuals reporting CSA memories recovered in therapy, relative to individuals with continuous abuse memories, and relative to controls reporting no history of abuse. Results showed that people reporting spontaneously recovered memories are superior in suppressing anxious autobiographical thoughts, both in the short term and long term (7 days). Our findings may partly explain why people with spontaneous CSA memories have the subjective impression that they have “repressed” their CSA

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Abstract

People with spontaneously recovered memories of childhood sexual abuse (CSA) have been shown to be especially susceptible to underestimating their prior remembering of the abuse events. The current study examined whether this may be explained by a reduced “meta-consciousness” of their intrusions related to those events: That is, are these individuals failing to notice that memories of abuse do come to mind, thereby producing the illusion that they repressed the abuse events for many years? We used an adapted thought-suppression paradigm,



The paper includes table with means, sd's, n's

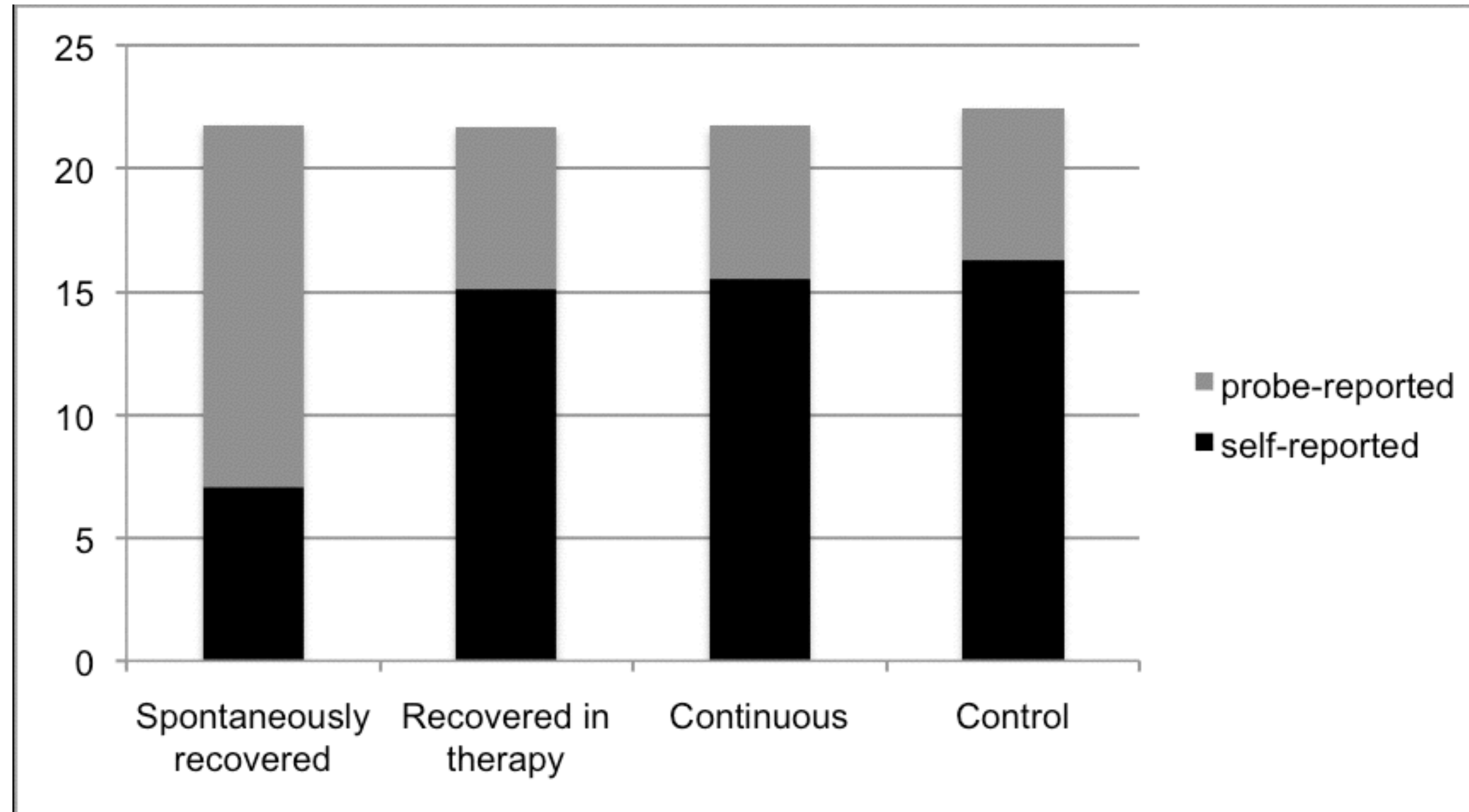


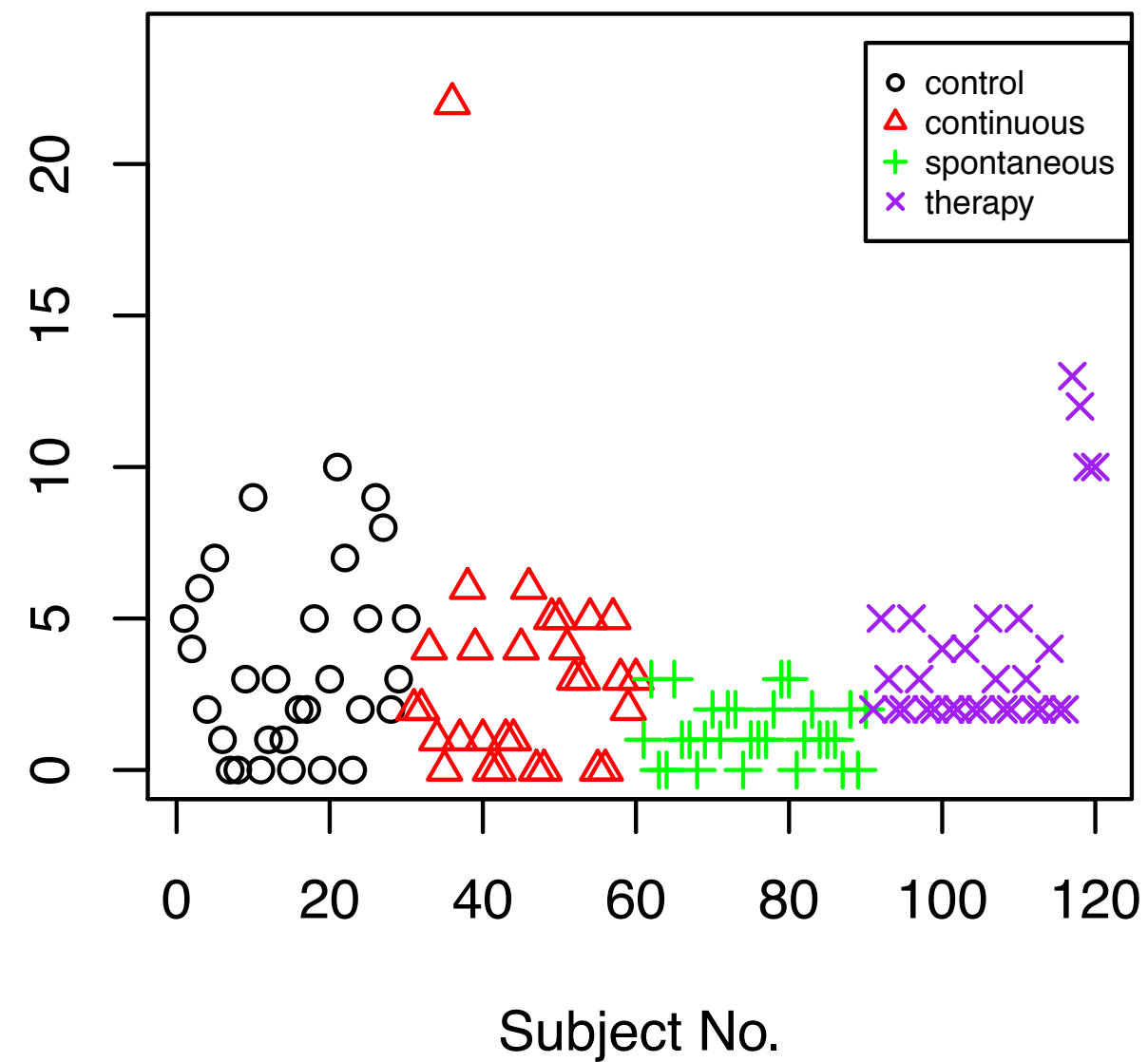
Figure 1. Summation of self-reported and probe-reported negative intrusions across the suppression and expression periods.



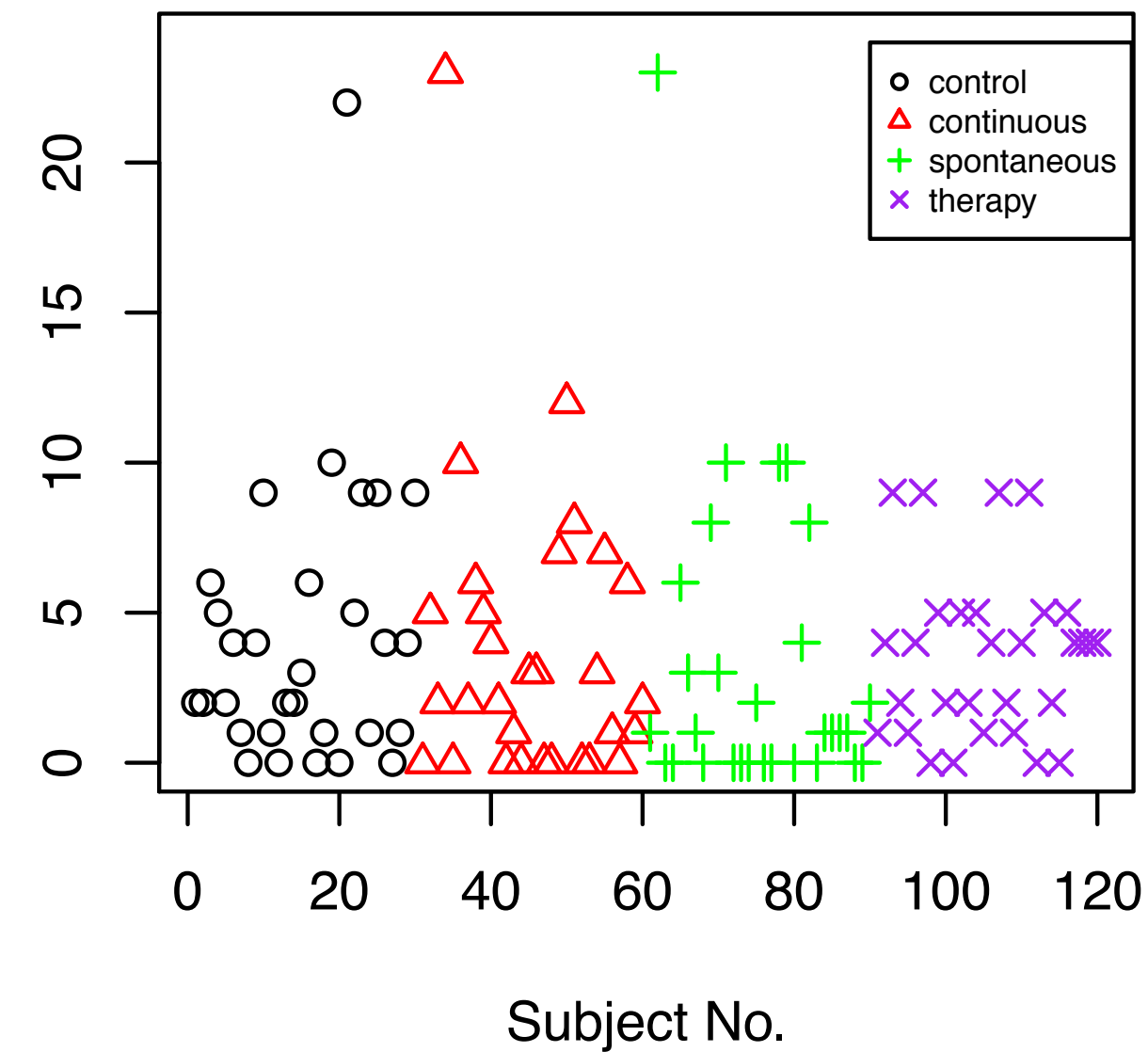
- I asked Geraerts for the data
- She couldn't give it to me because it was property of Maastricht University
- Maastricht/Harvard co-authors wrote to me that they gave permission (they didn't have the data!)
- Journalist wrote in newspaper that Geraerts had agreed to give me the data
- Head of Geraerts' institute forbid it
- At last I did get the data under strict confidentiality conditions

But the data is in these graphics, published by Erasmus Univ!

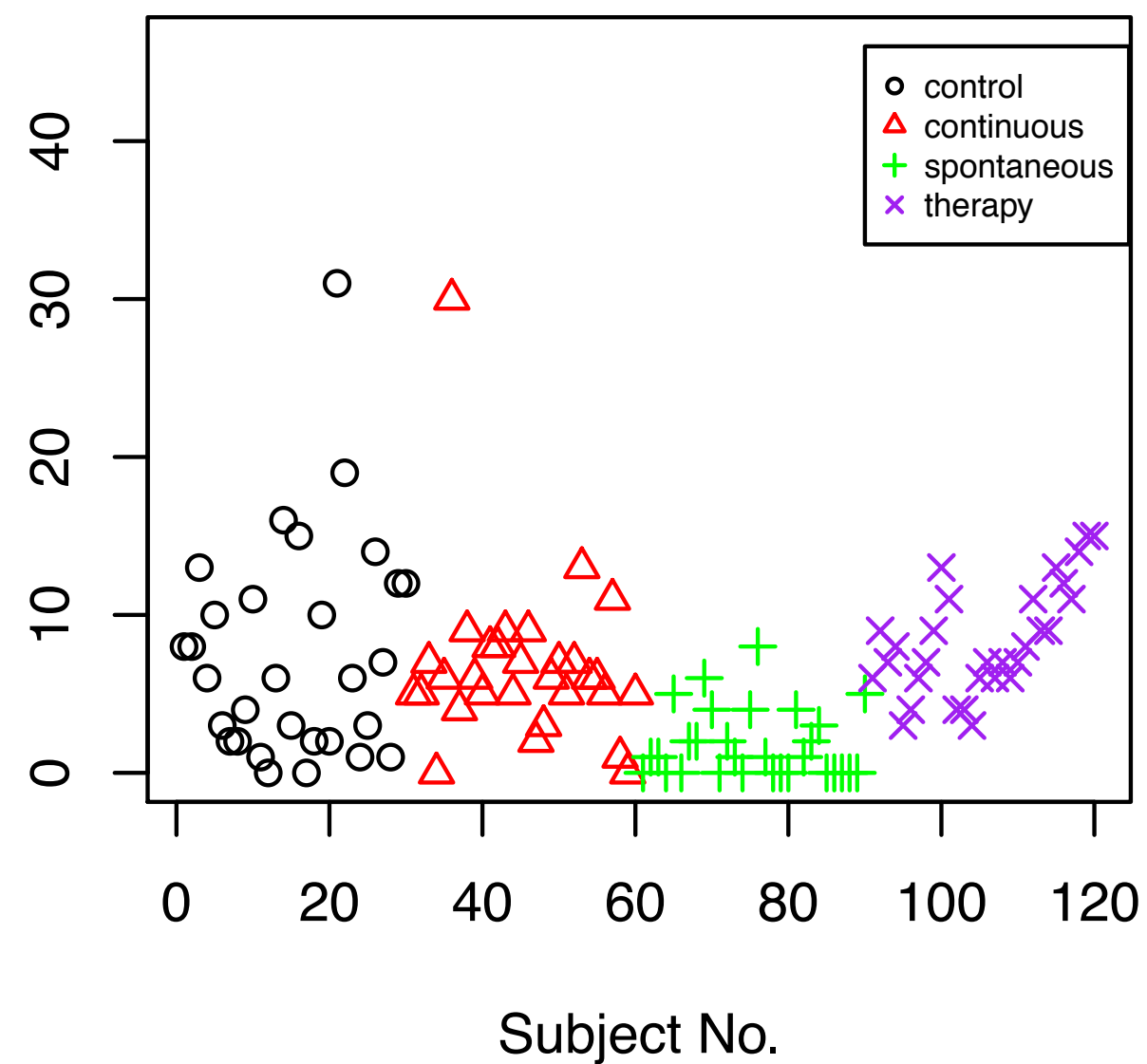
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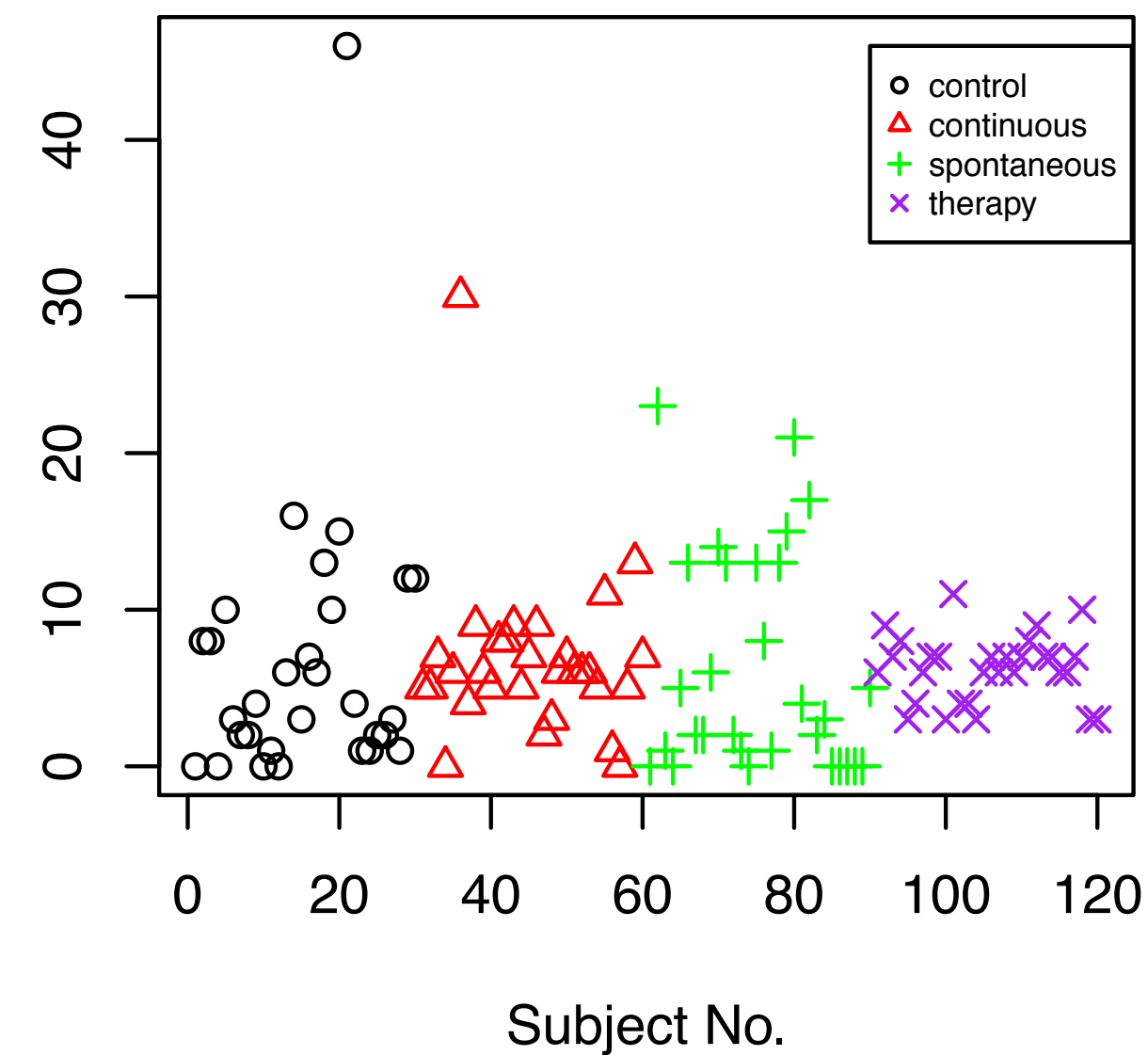
Suppression Positive



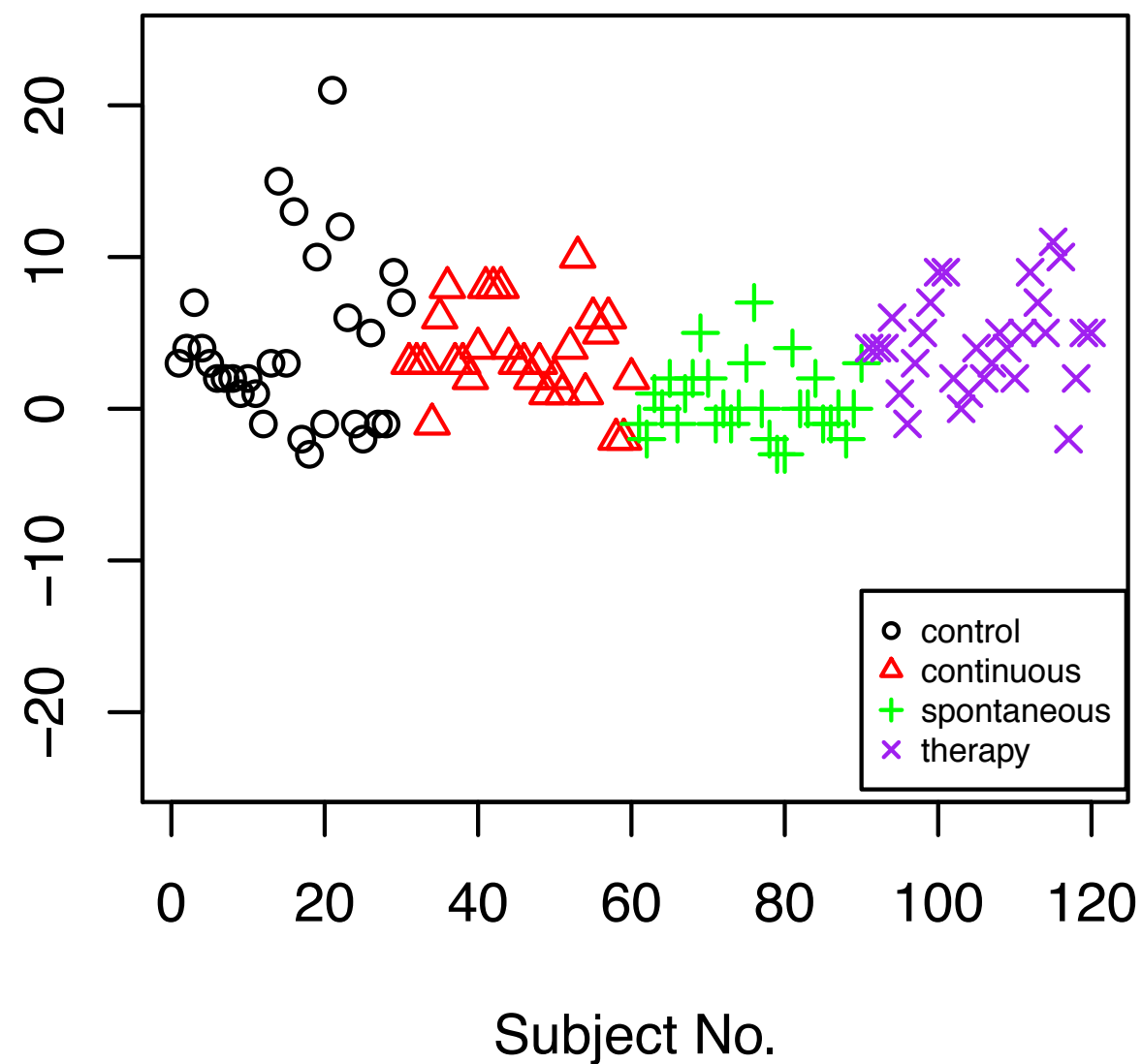
Expression Negative



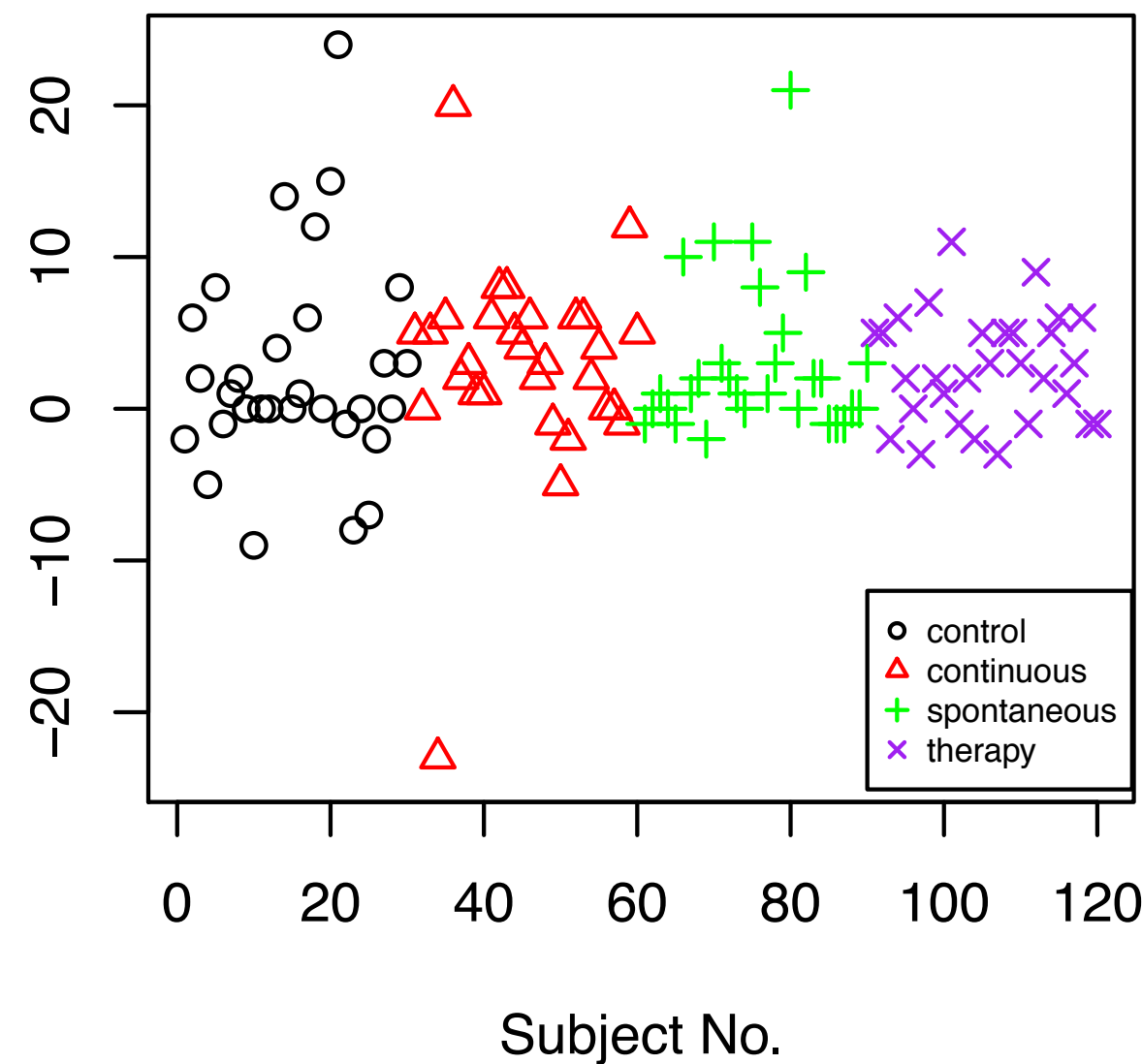
Expression Positive



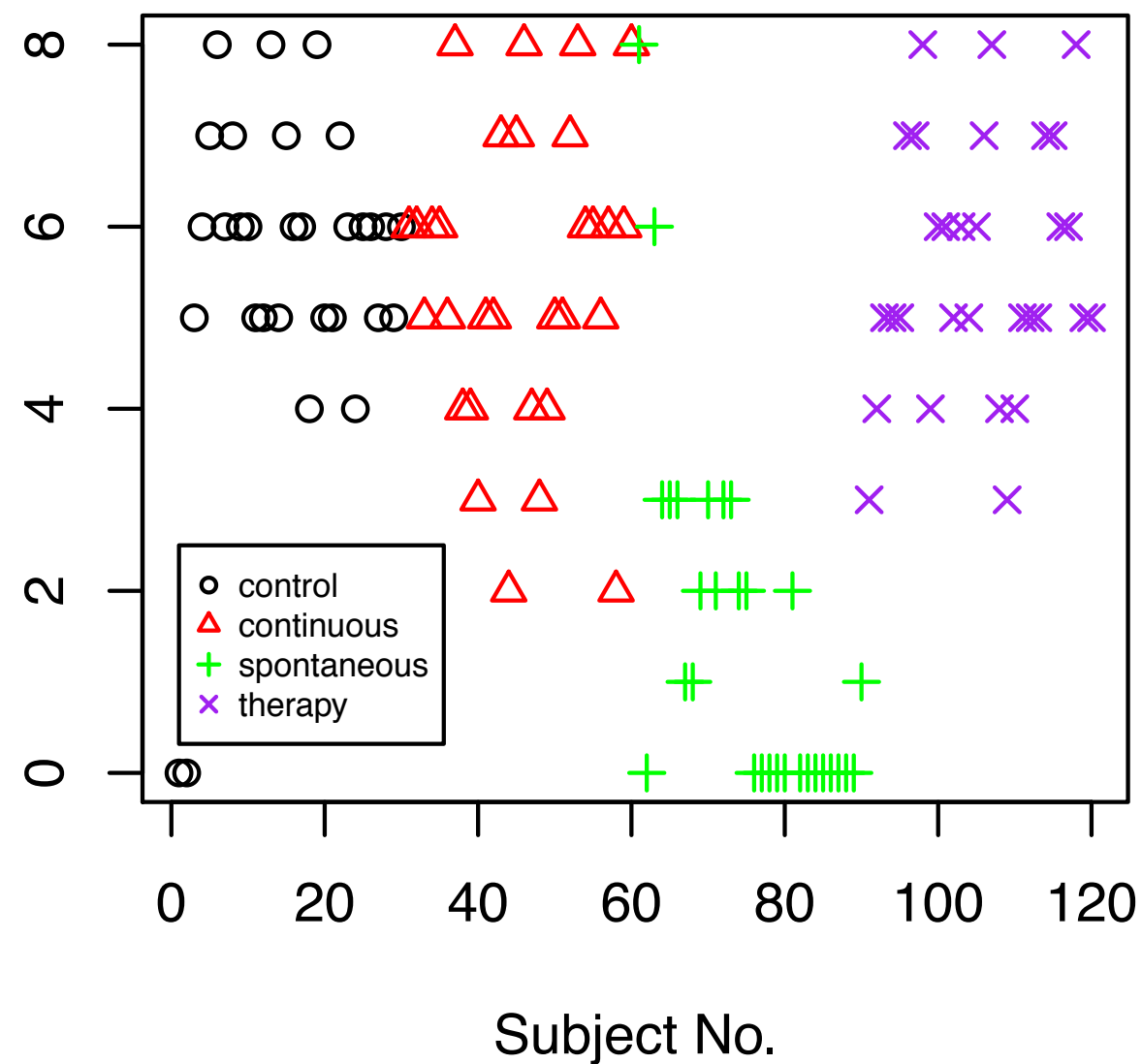
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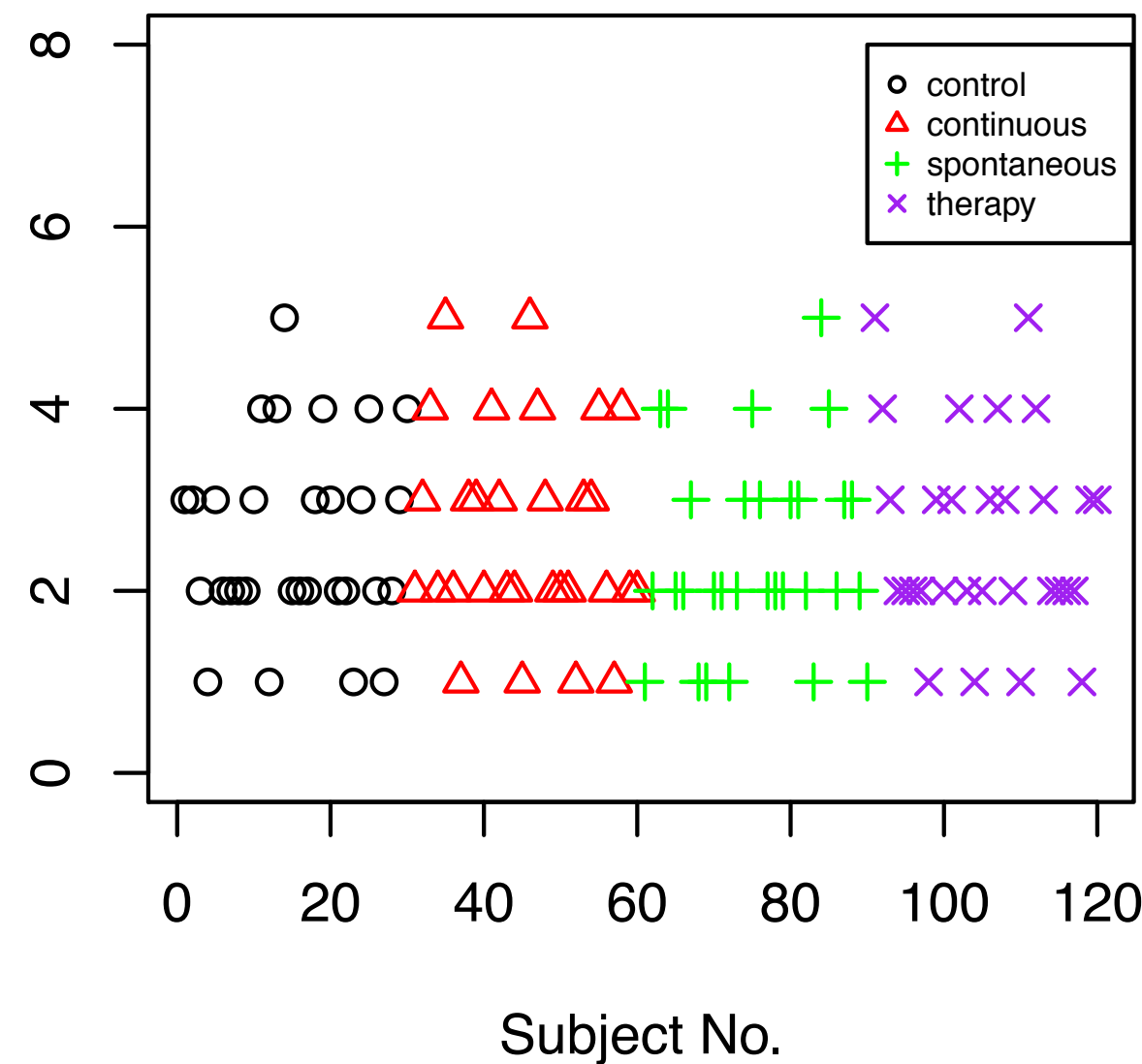
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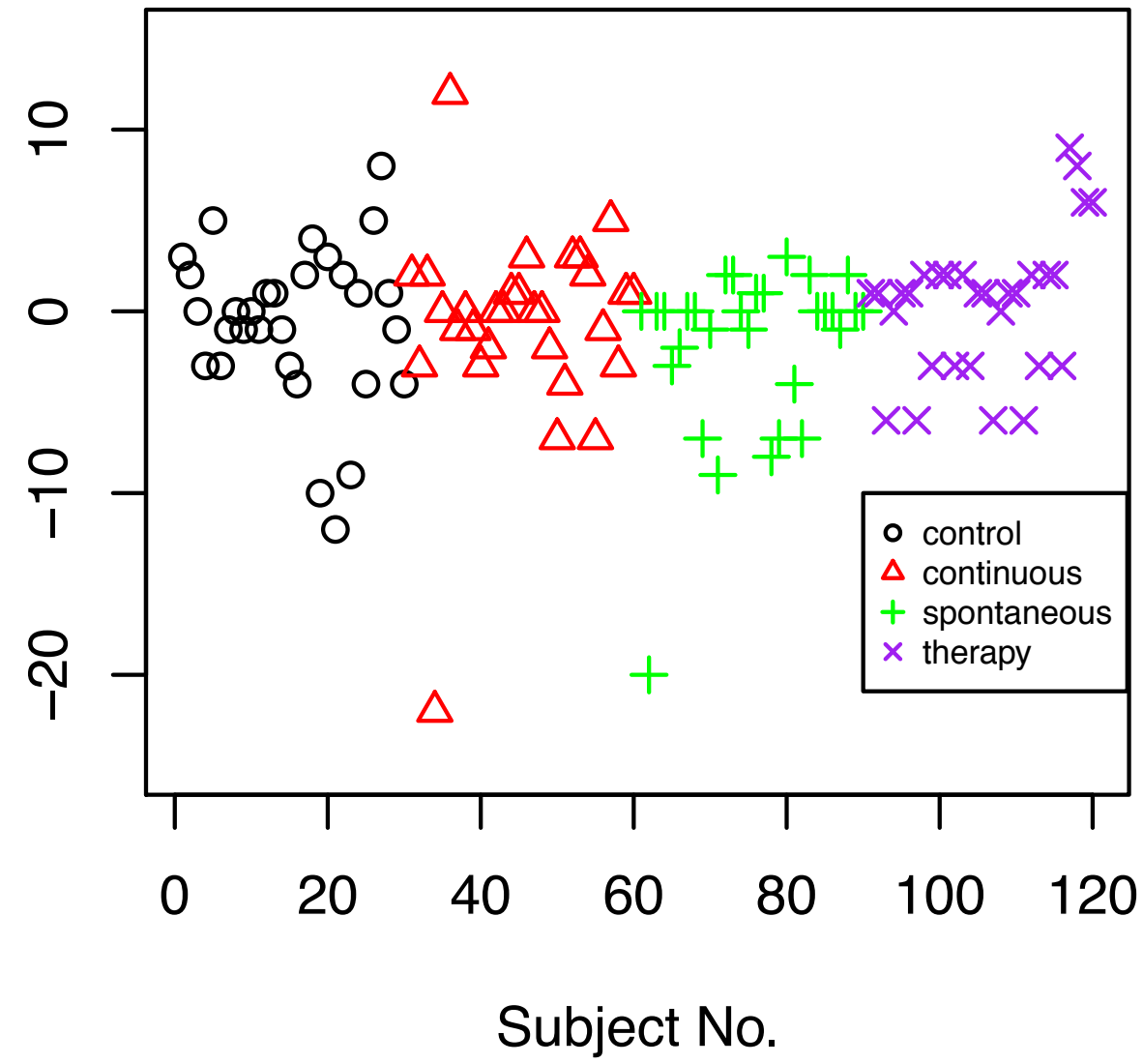
Intrusions Negative



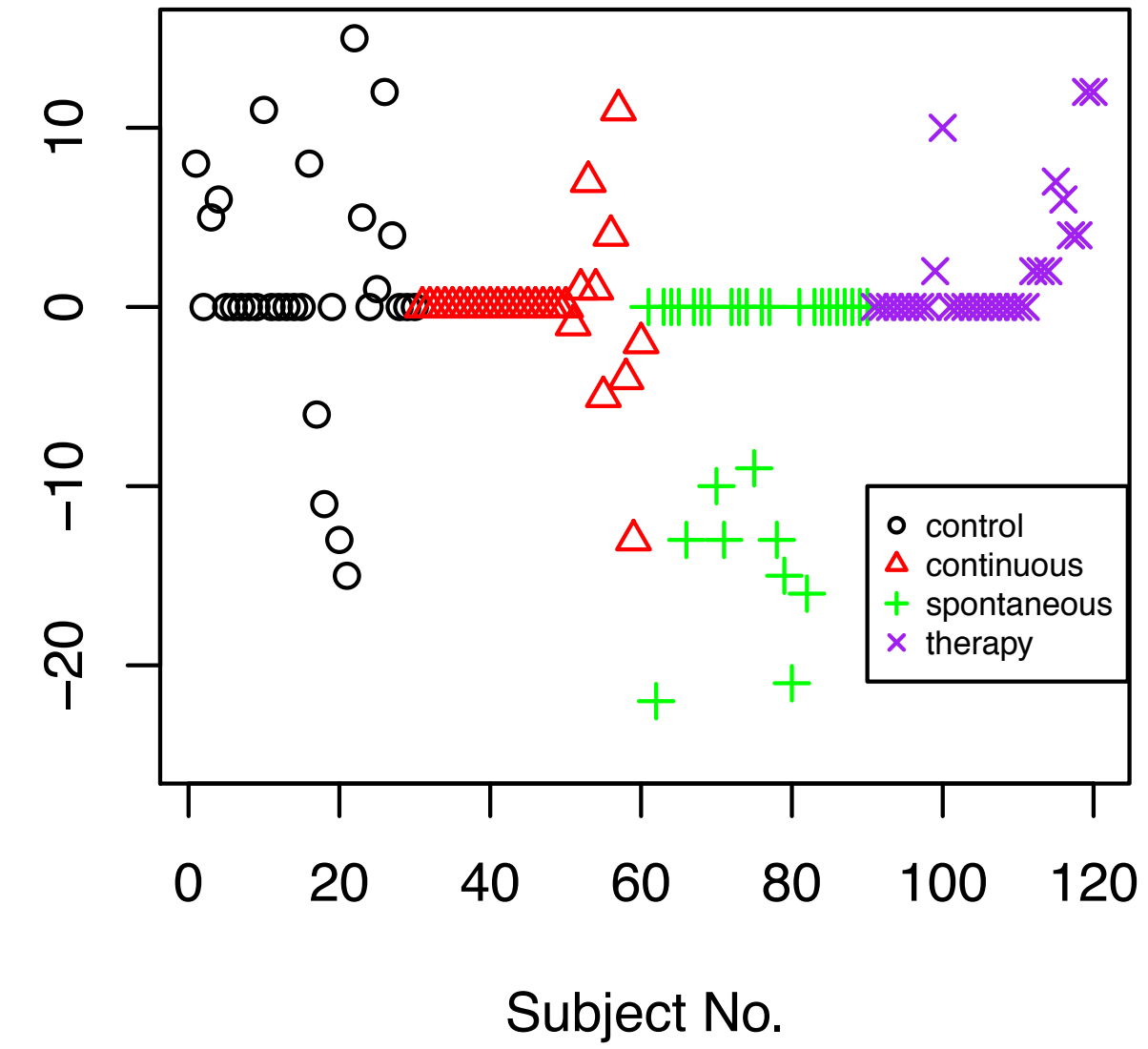
Intrusions Positive



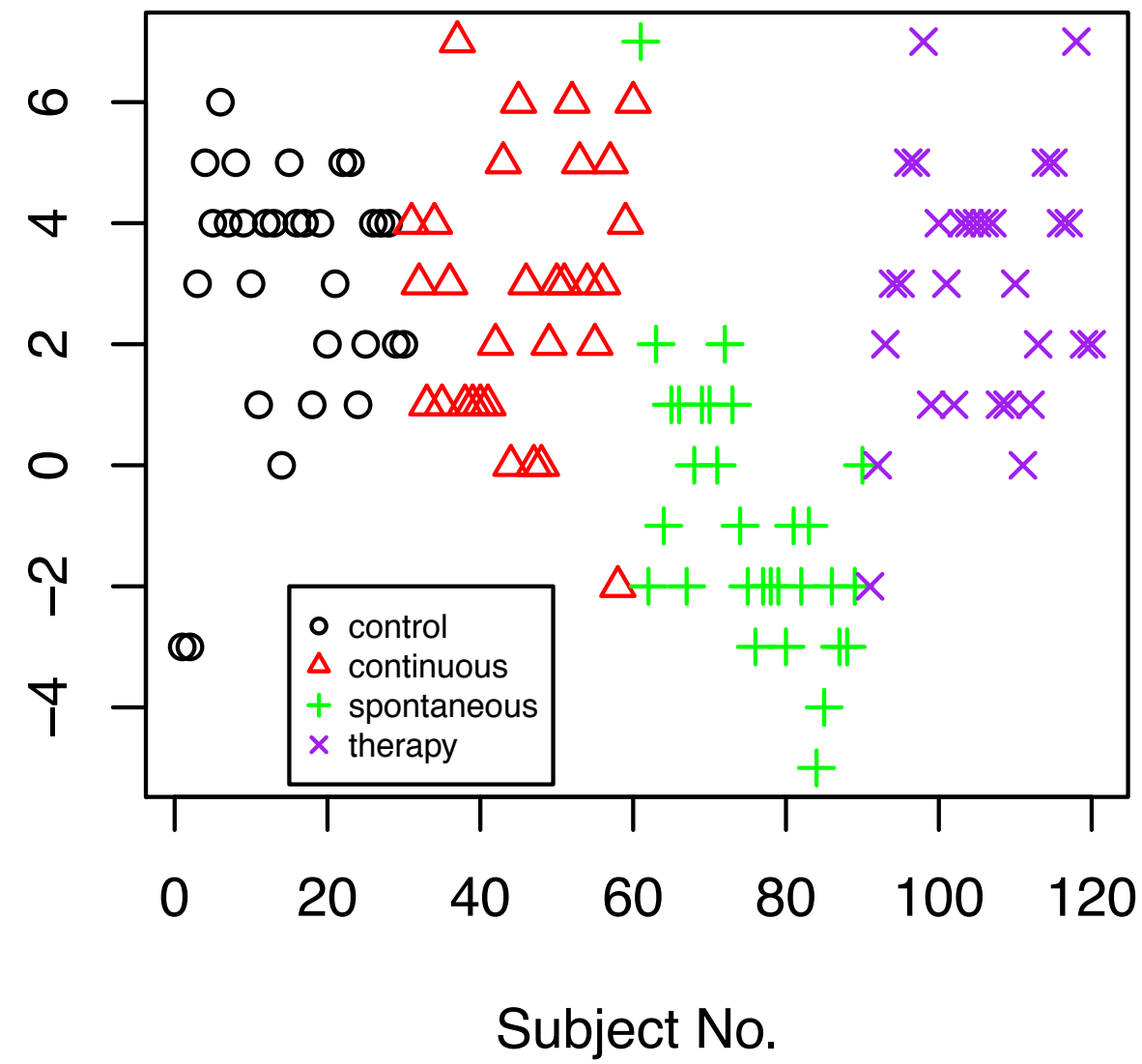
Suppression, Neg – Pos



Expression, Neg – Pos



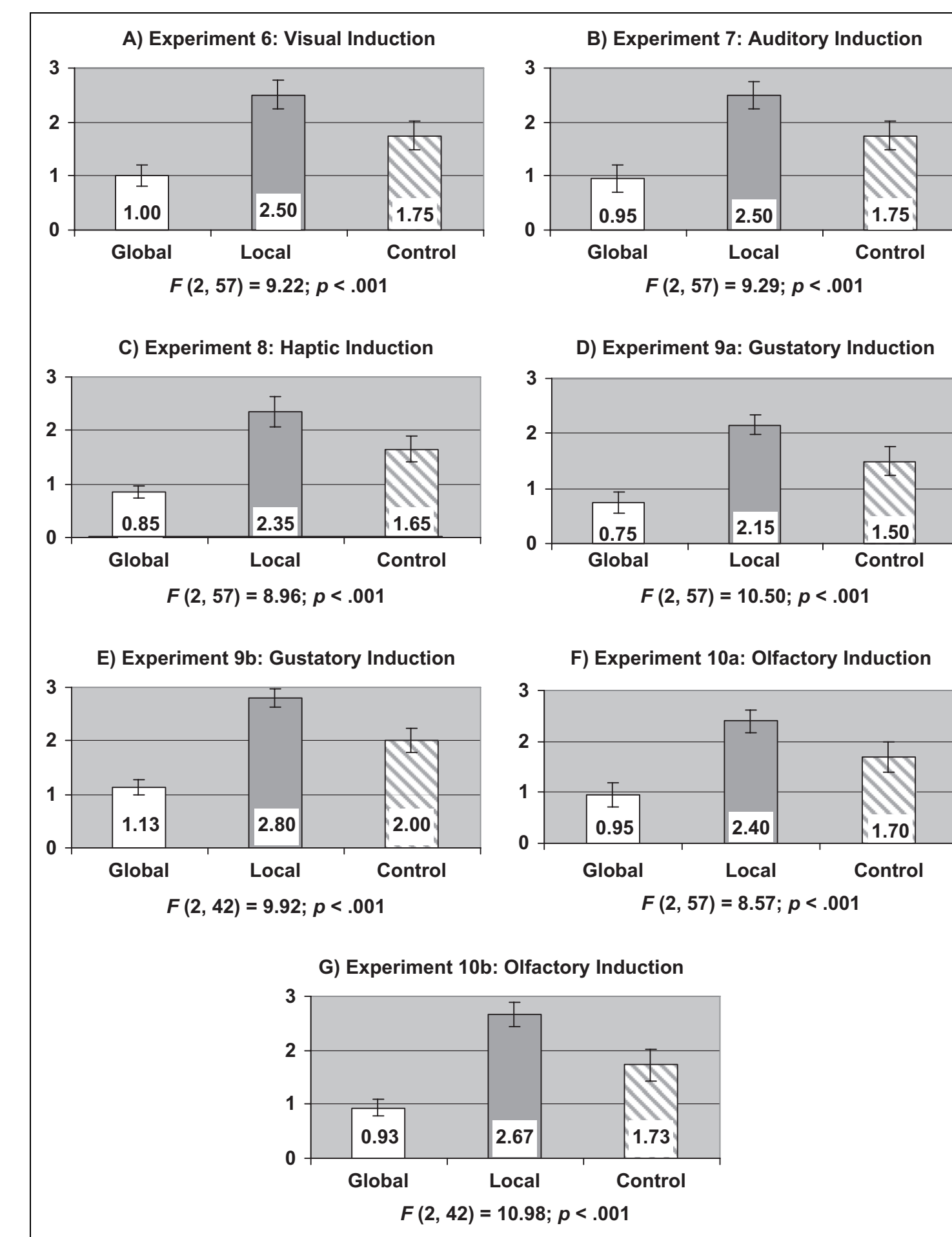
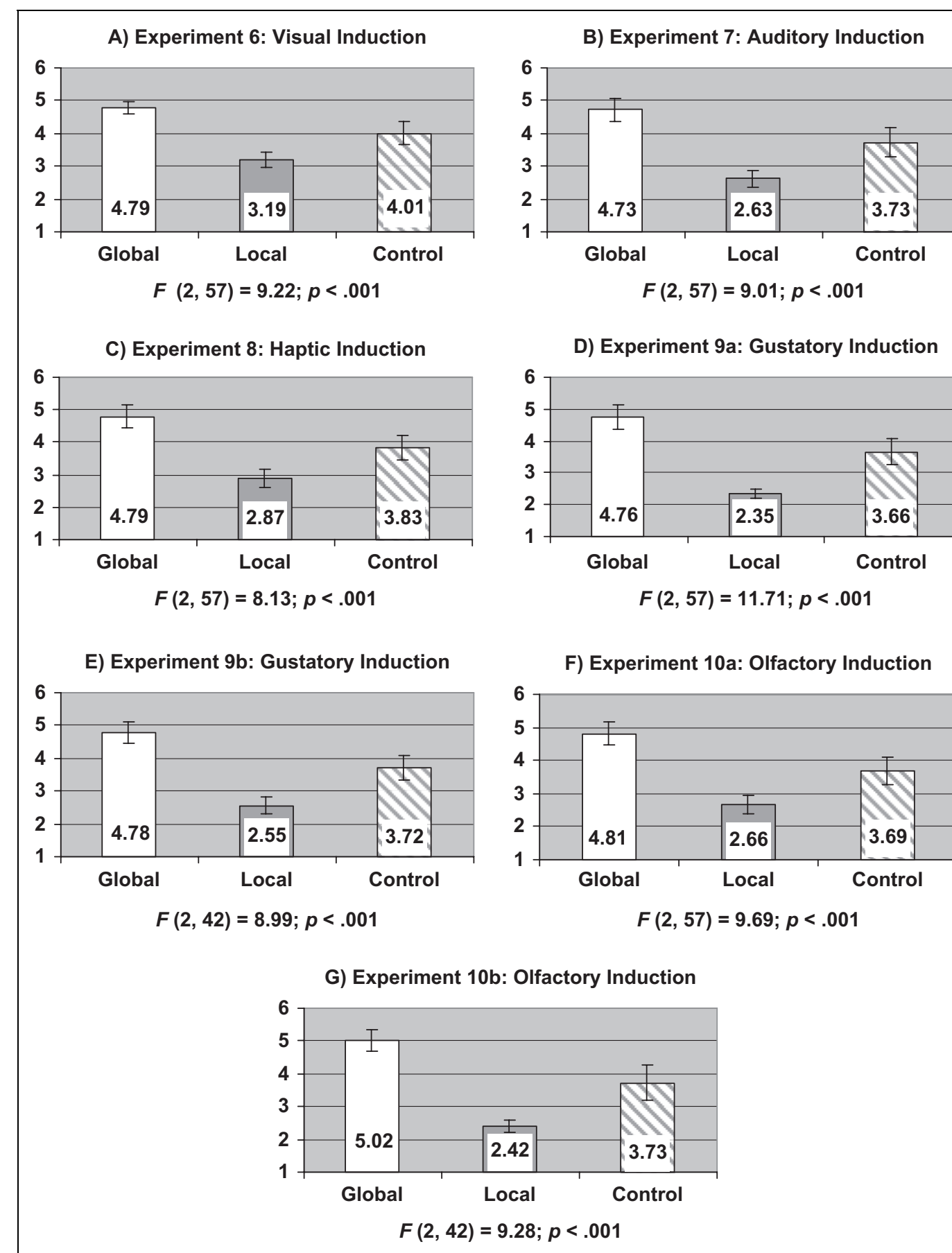
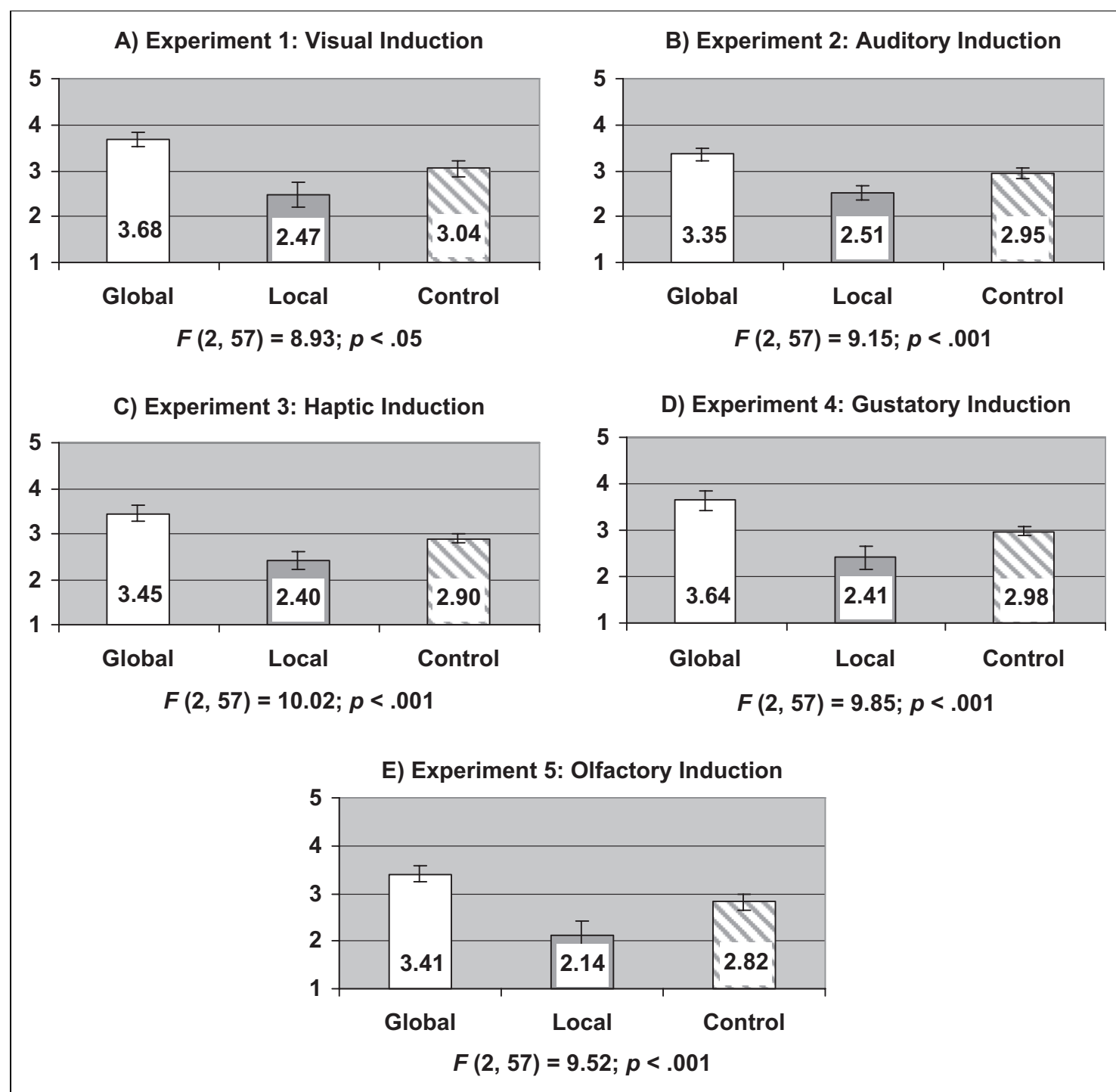
Diary, Neg – Pos



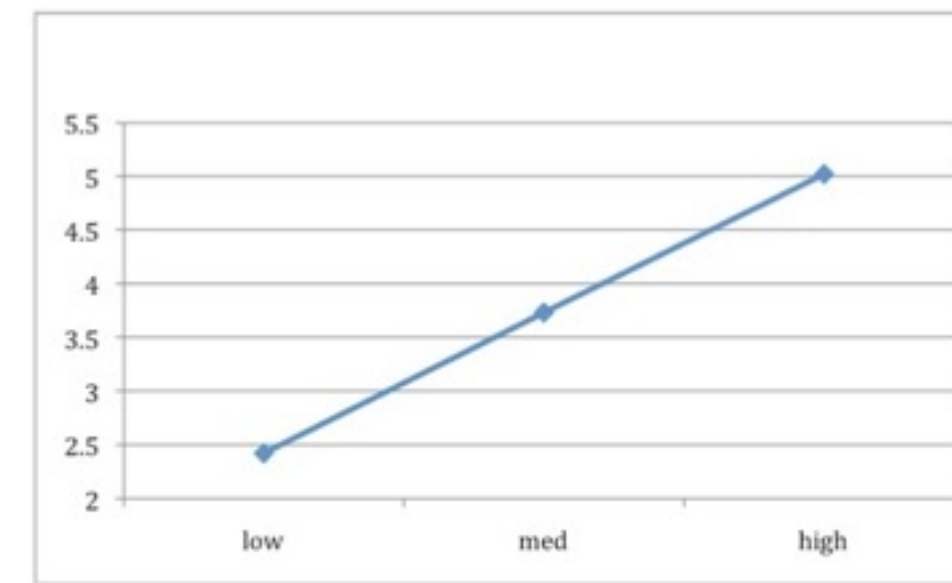
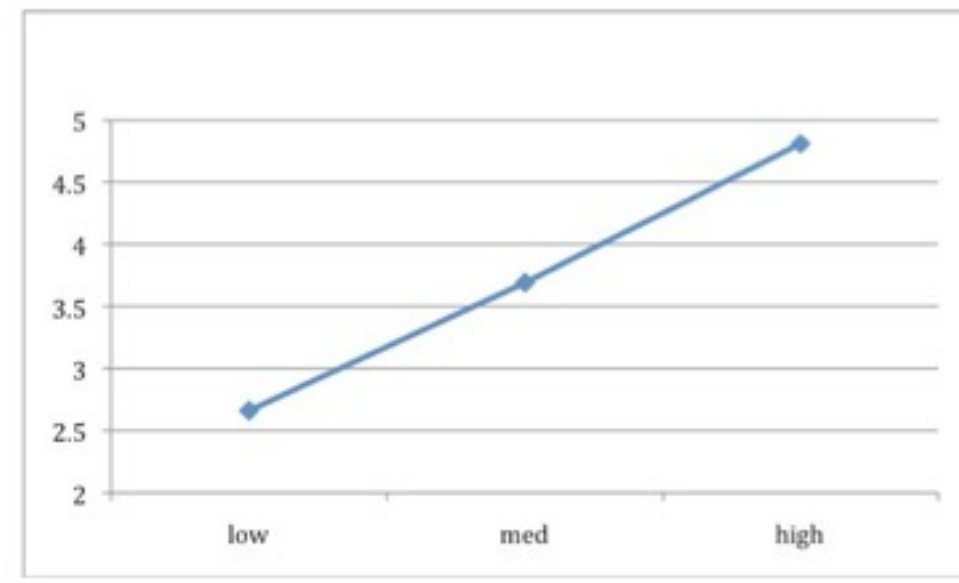
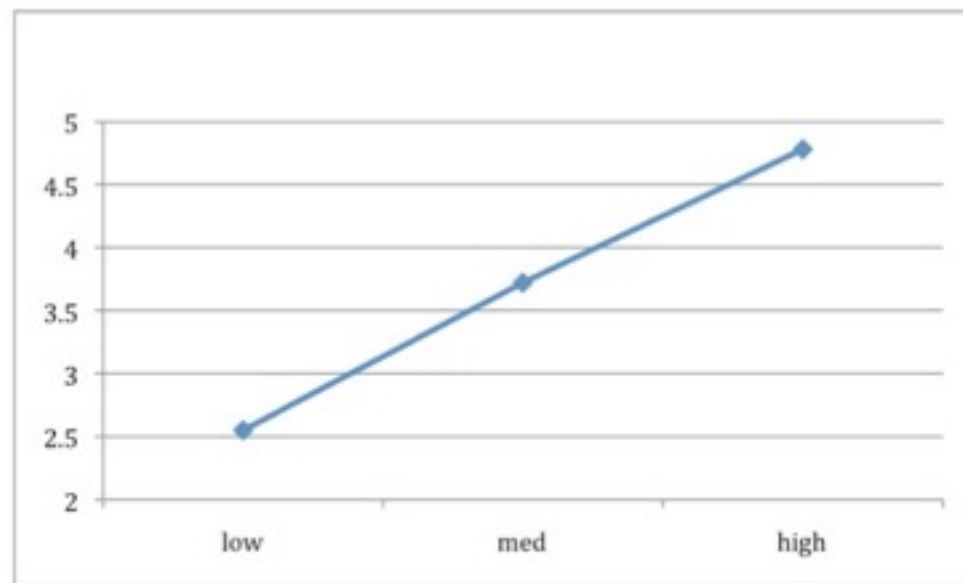
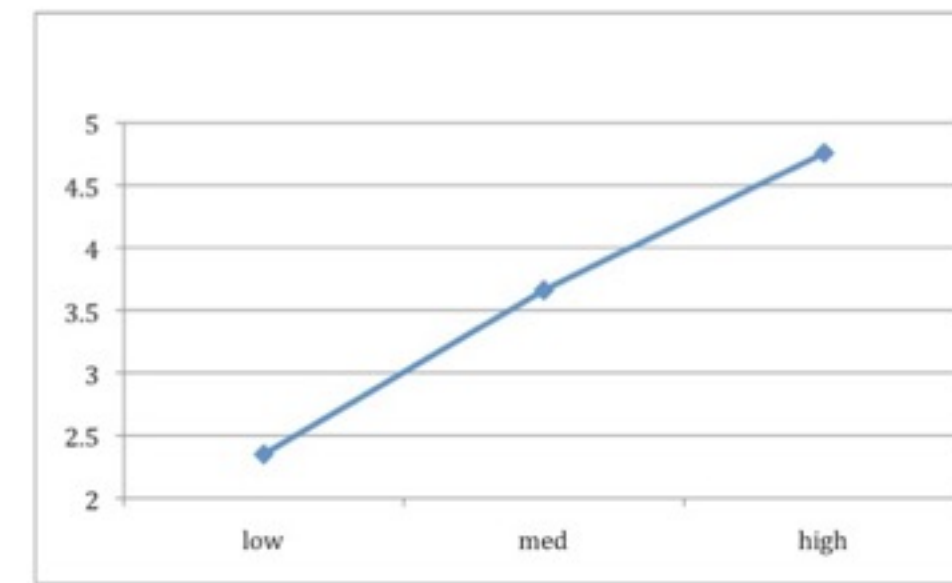
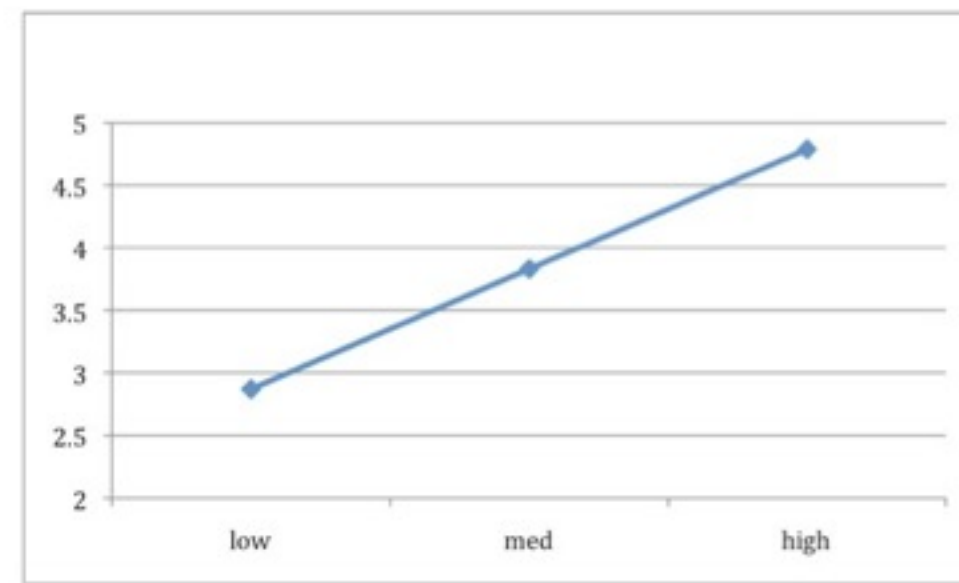
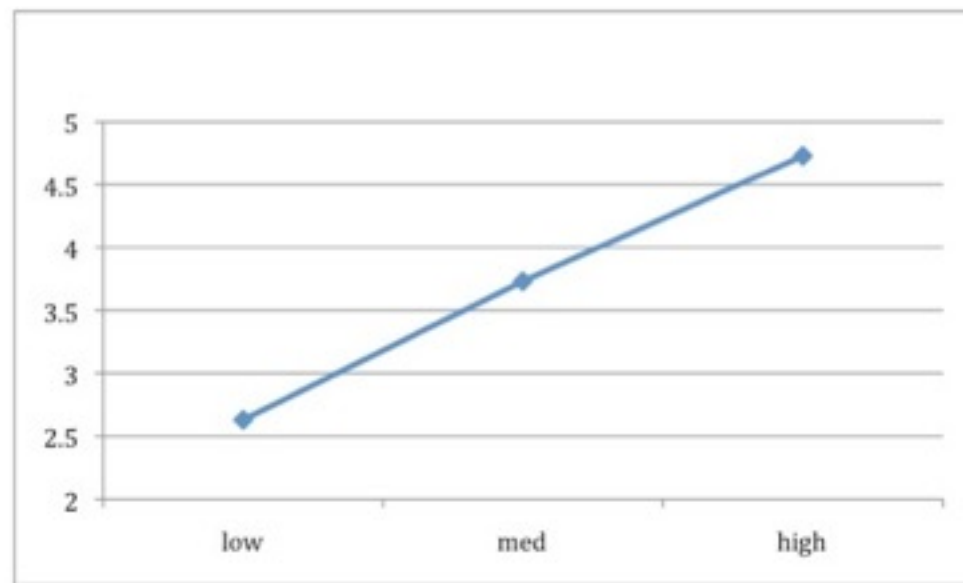
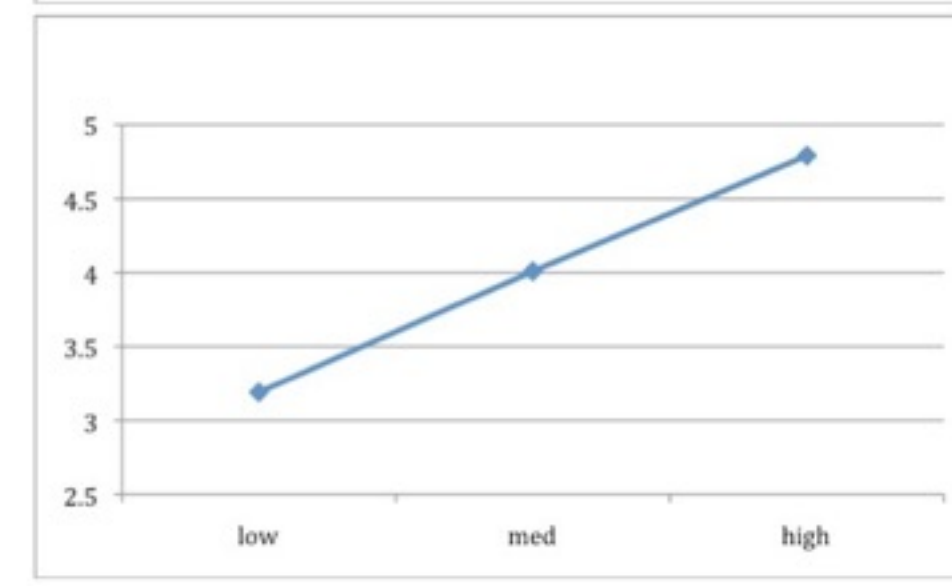
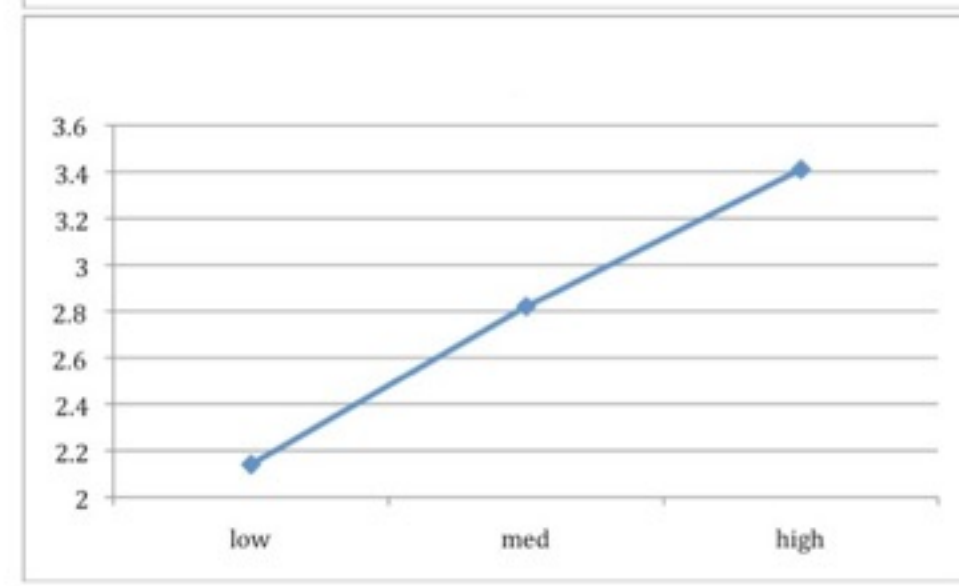
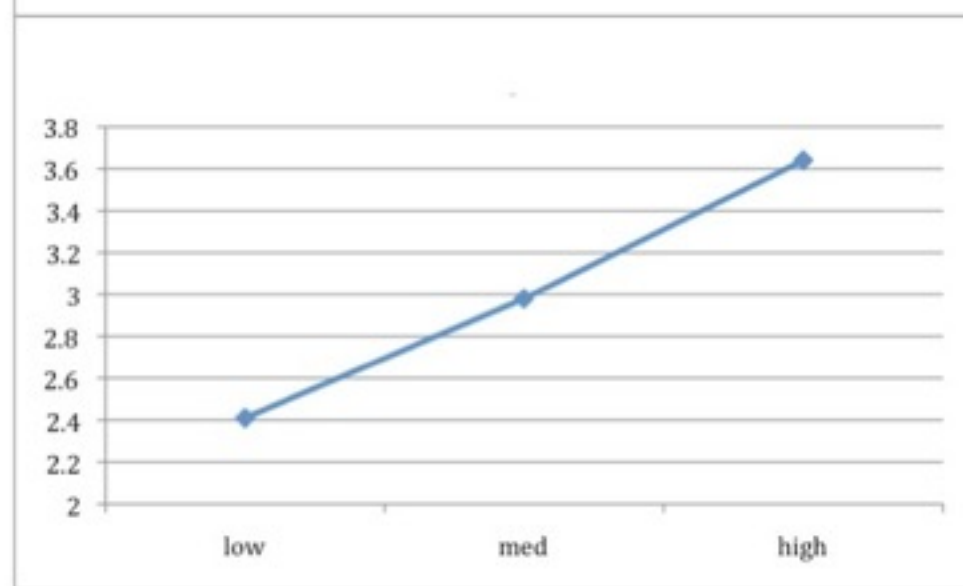
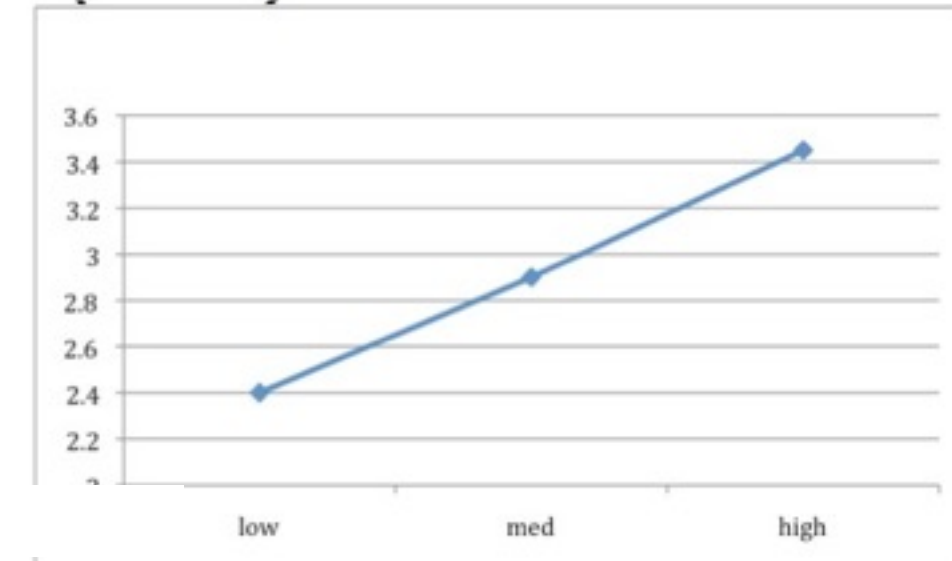
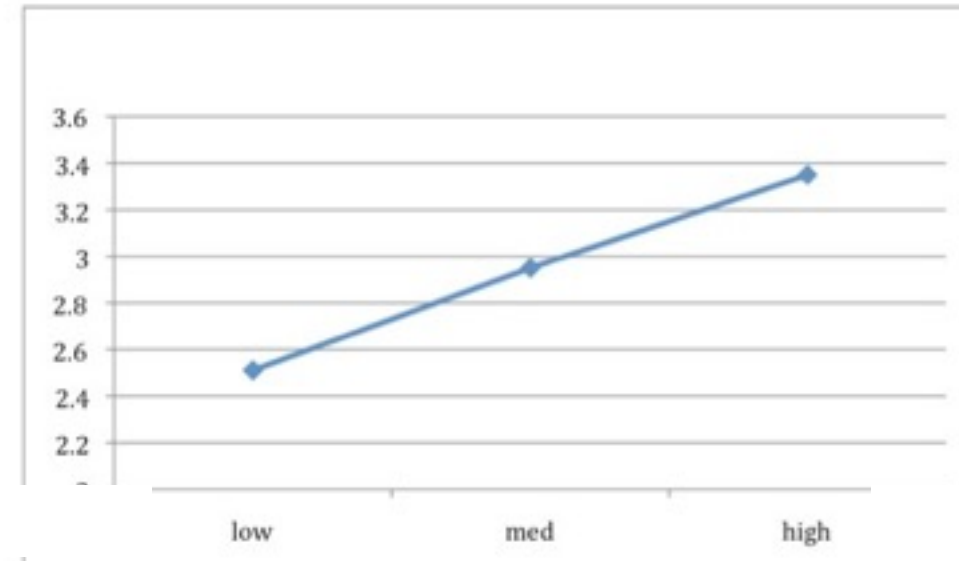
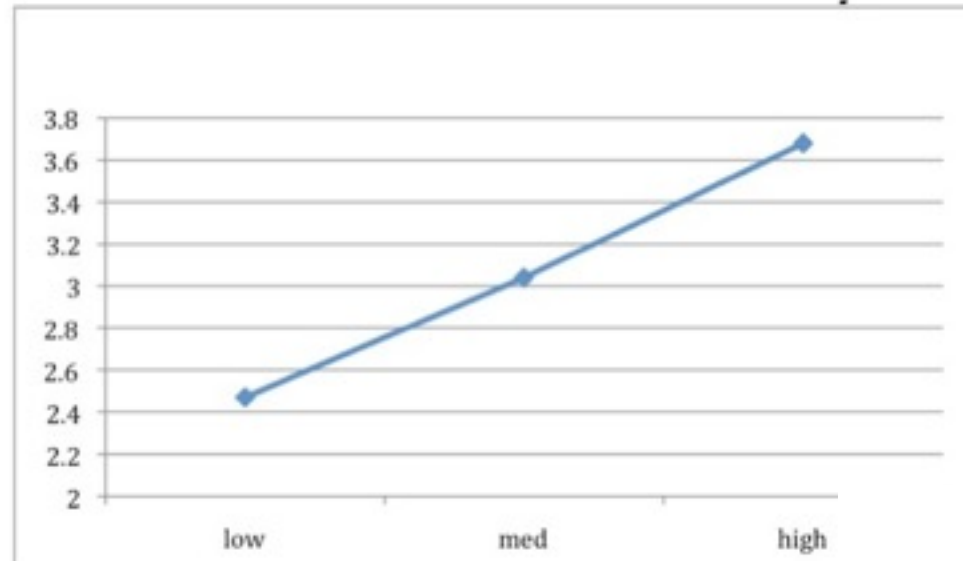
The data files are garbage!



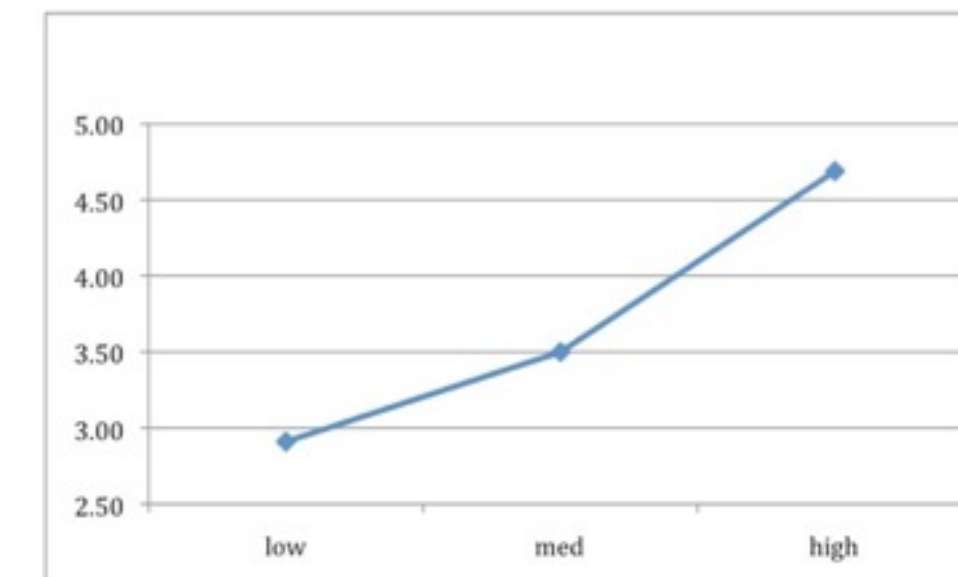
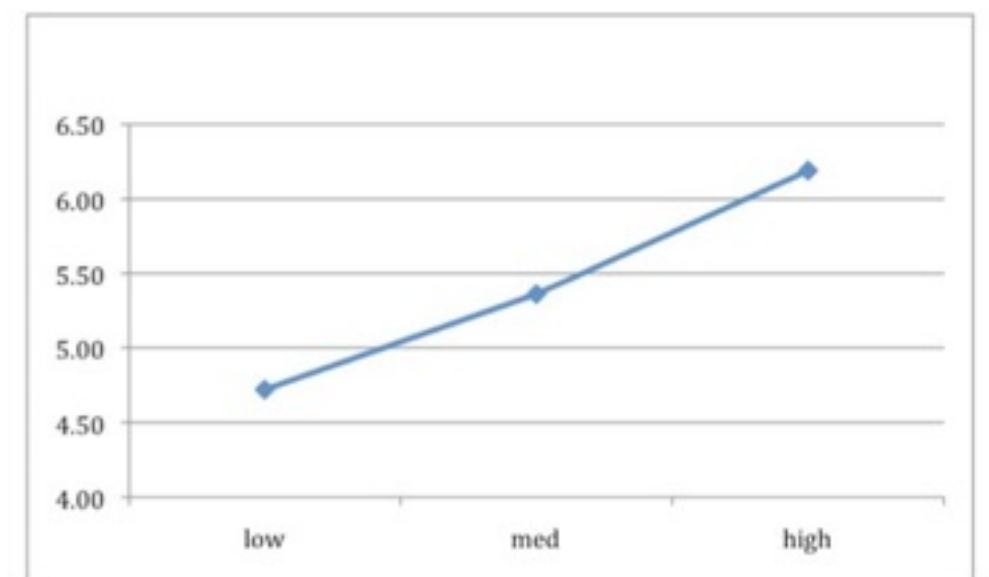
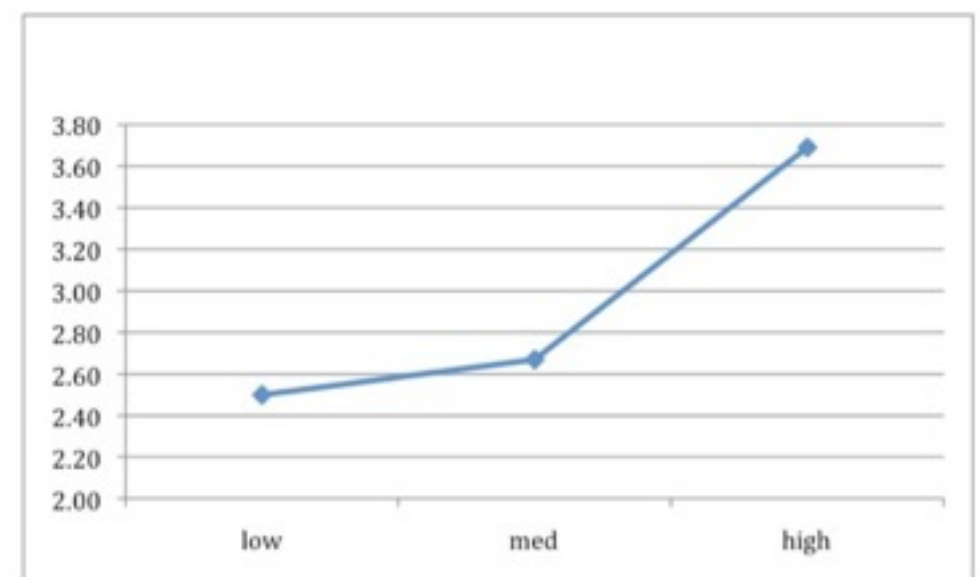
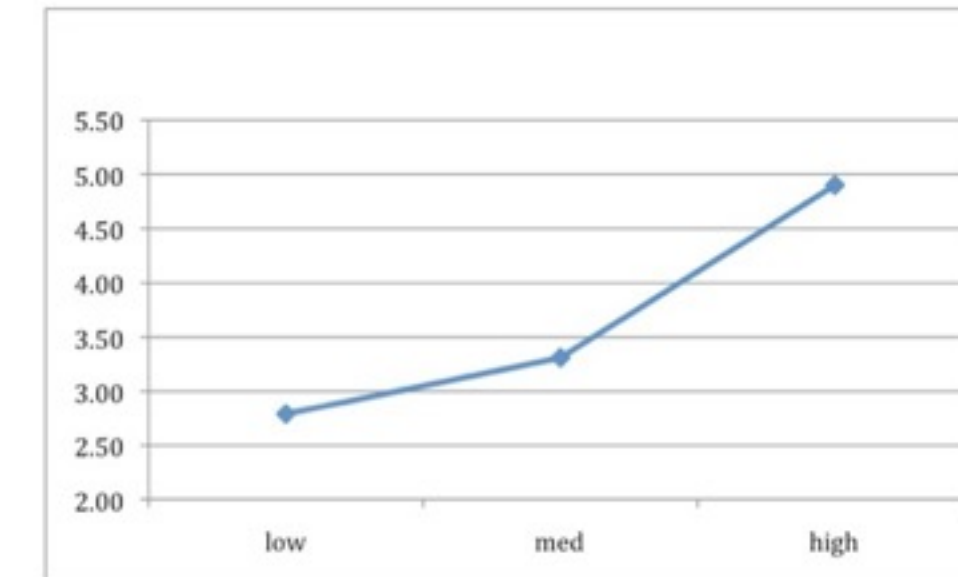
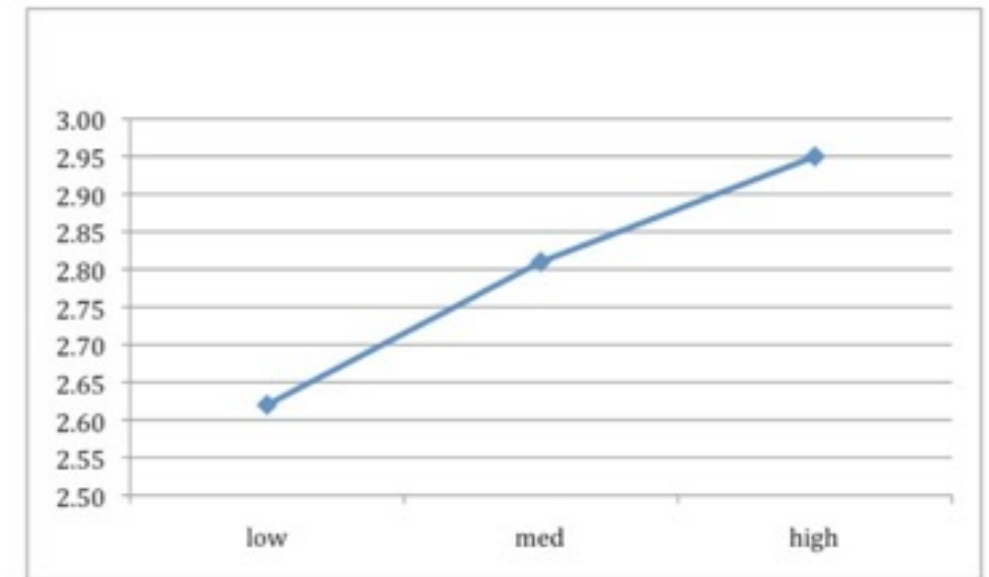
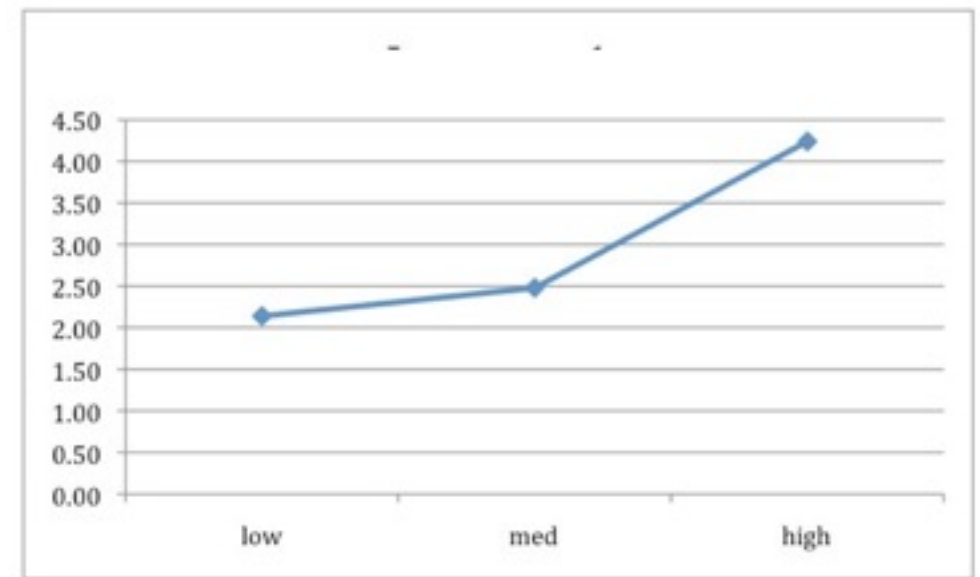
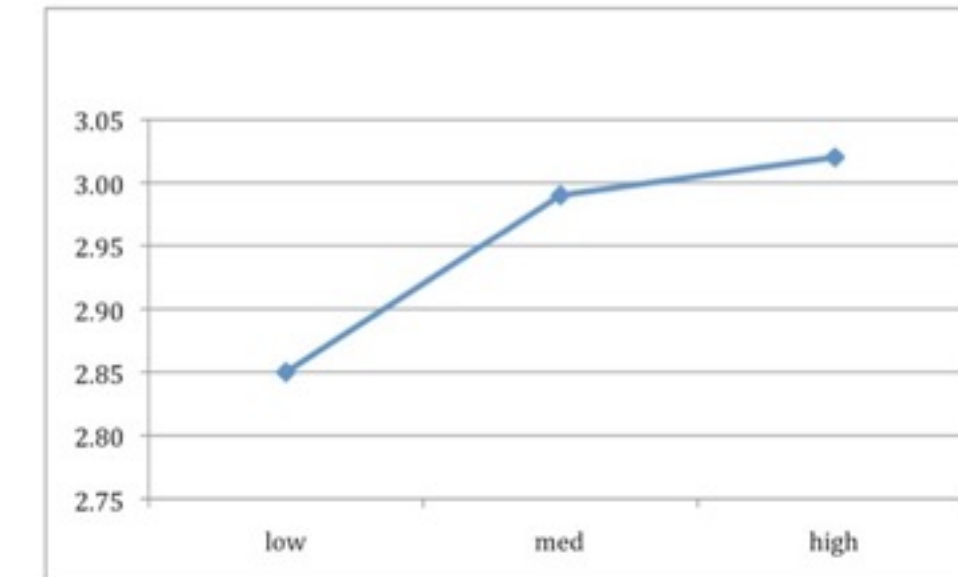
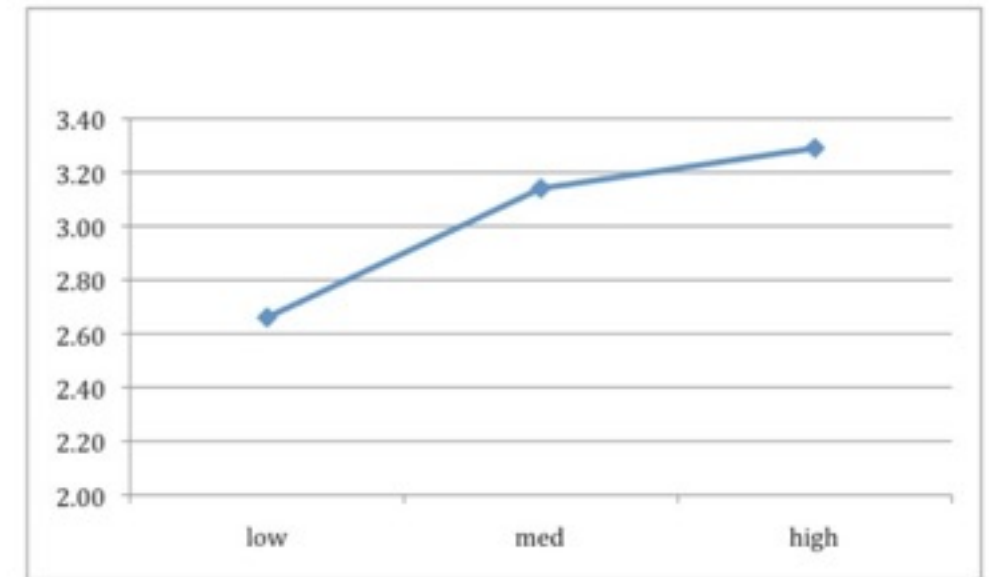
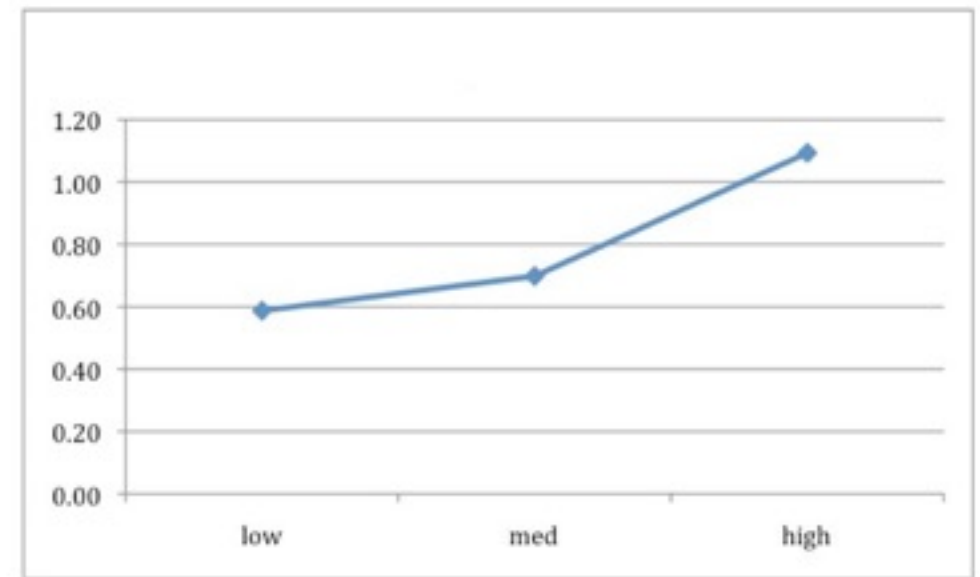
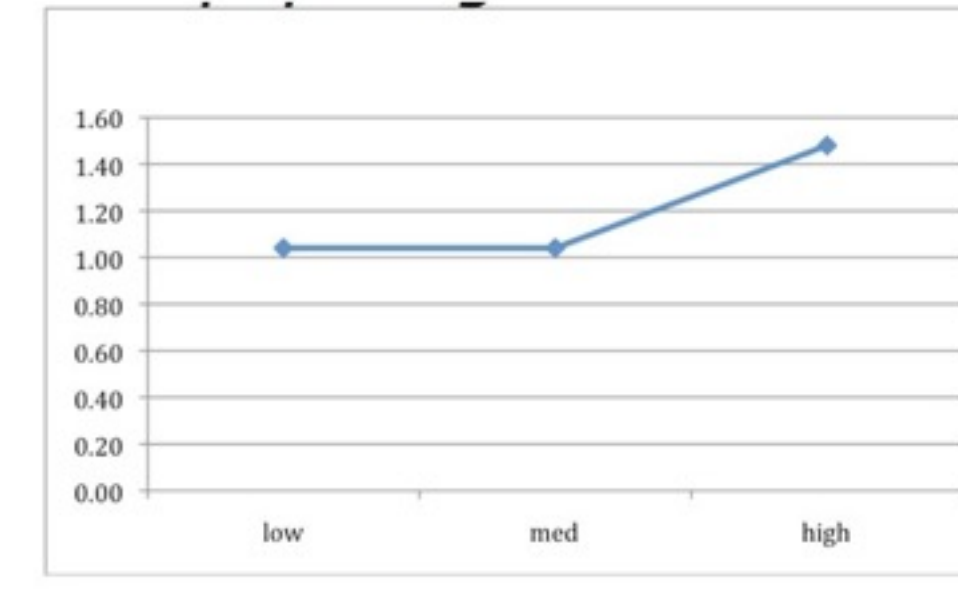
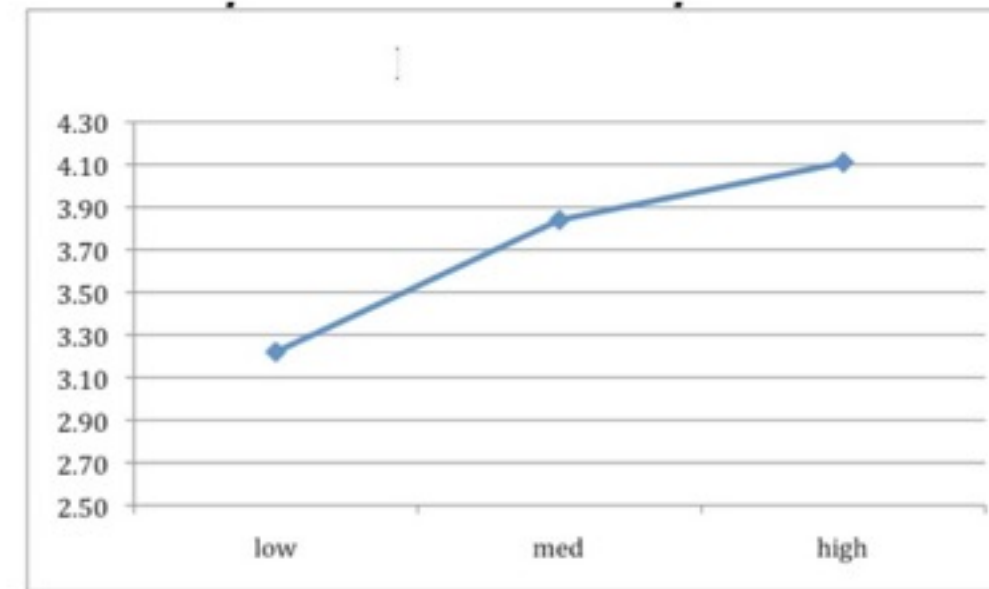
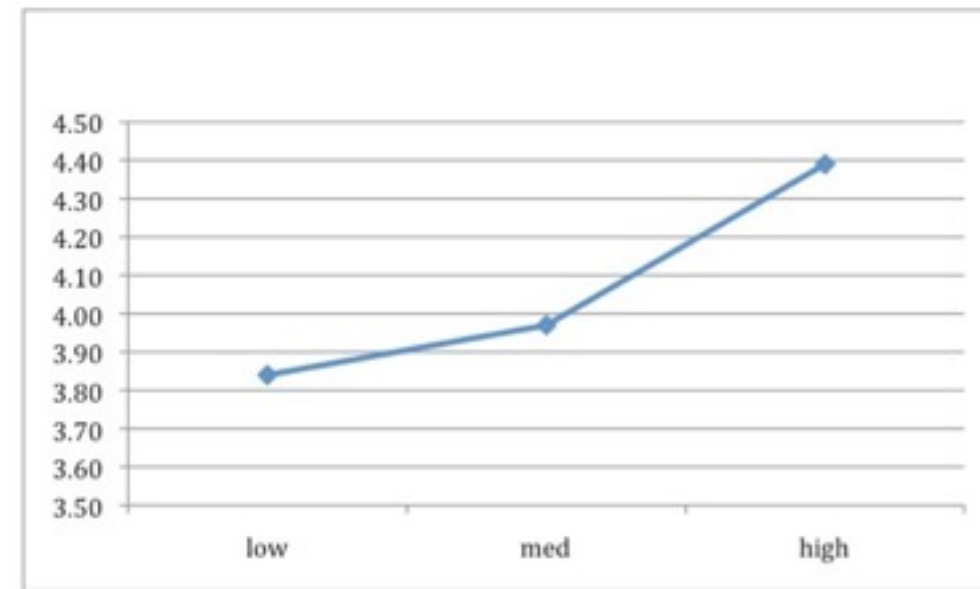
Next example



Förster & Denzler



similar studies

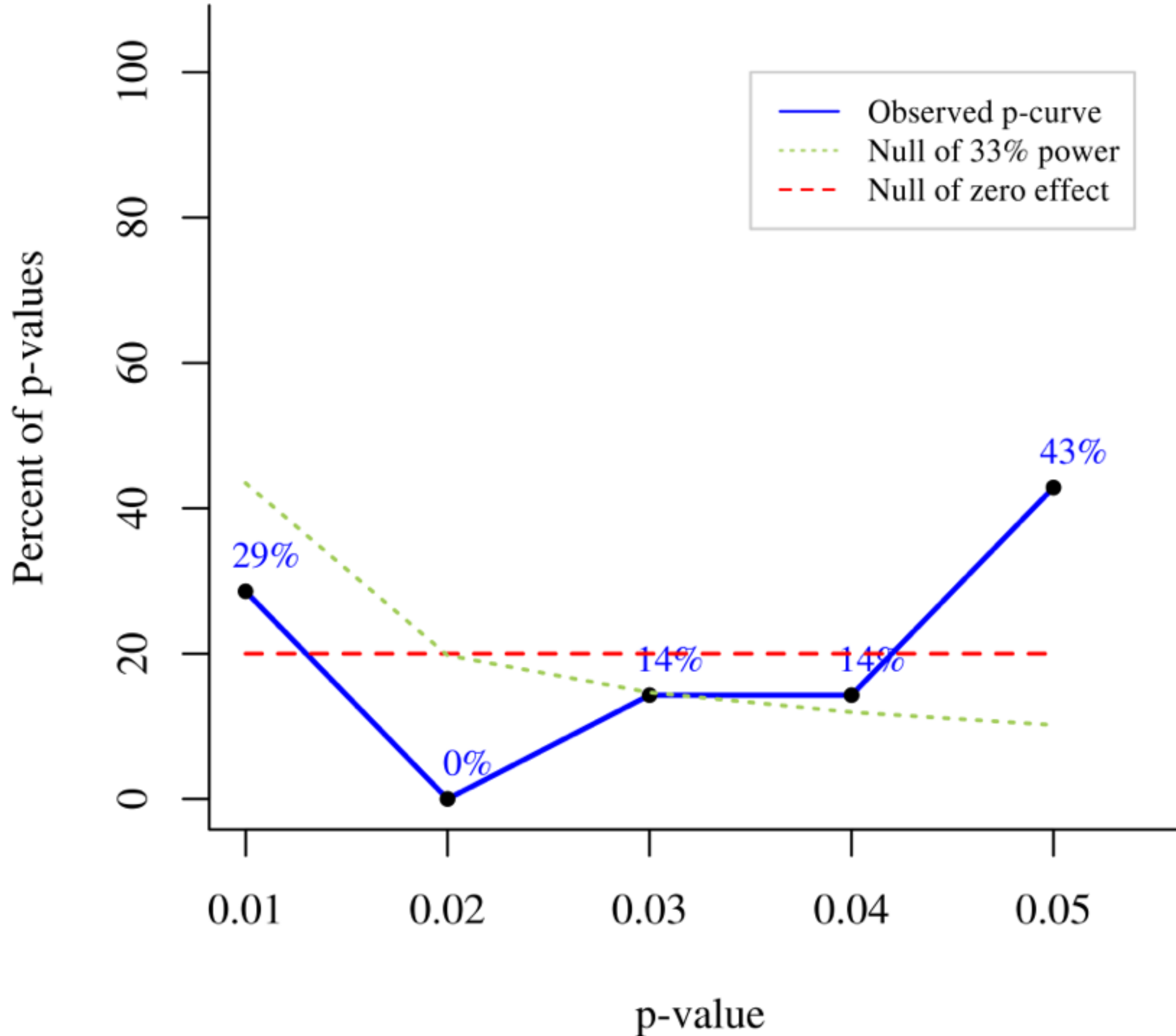


Whistleblower's report at UvA leads to retraction of several papers

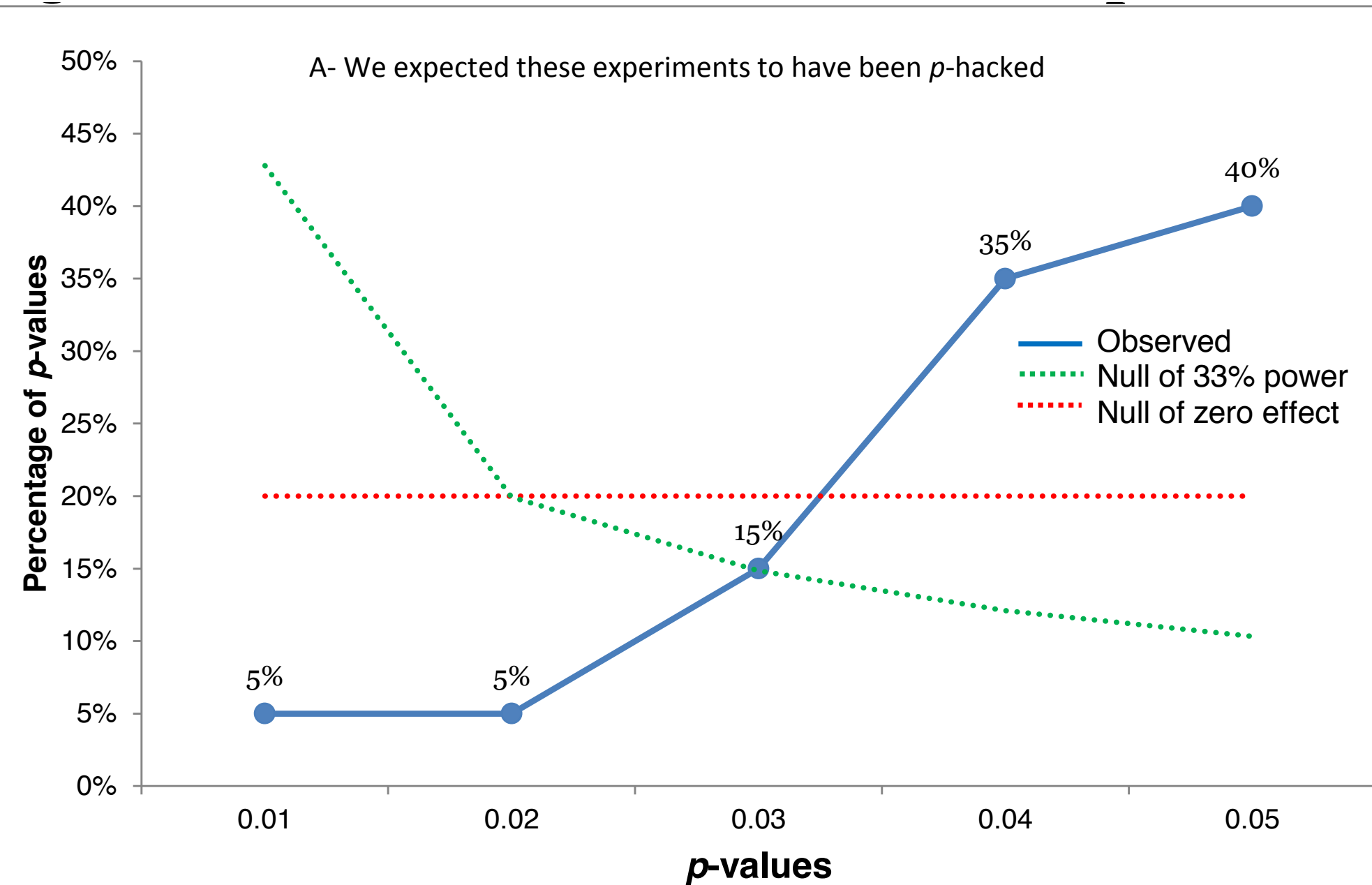
- The data is too good to be true
- Förster has lost all original records, does not know which assistants when, where, did the experiments
- Could this pattern be caused by QRP's?
- e.g. the file-drawer effect?

Simonsohn et al: P-curve: A Key To The File Drawer

p-curve results



The file-drawer effect



Statistical Inference

1) Studies contain evidential value
(right-skewed)

$\chi^2(40)=18.3, p=.999$

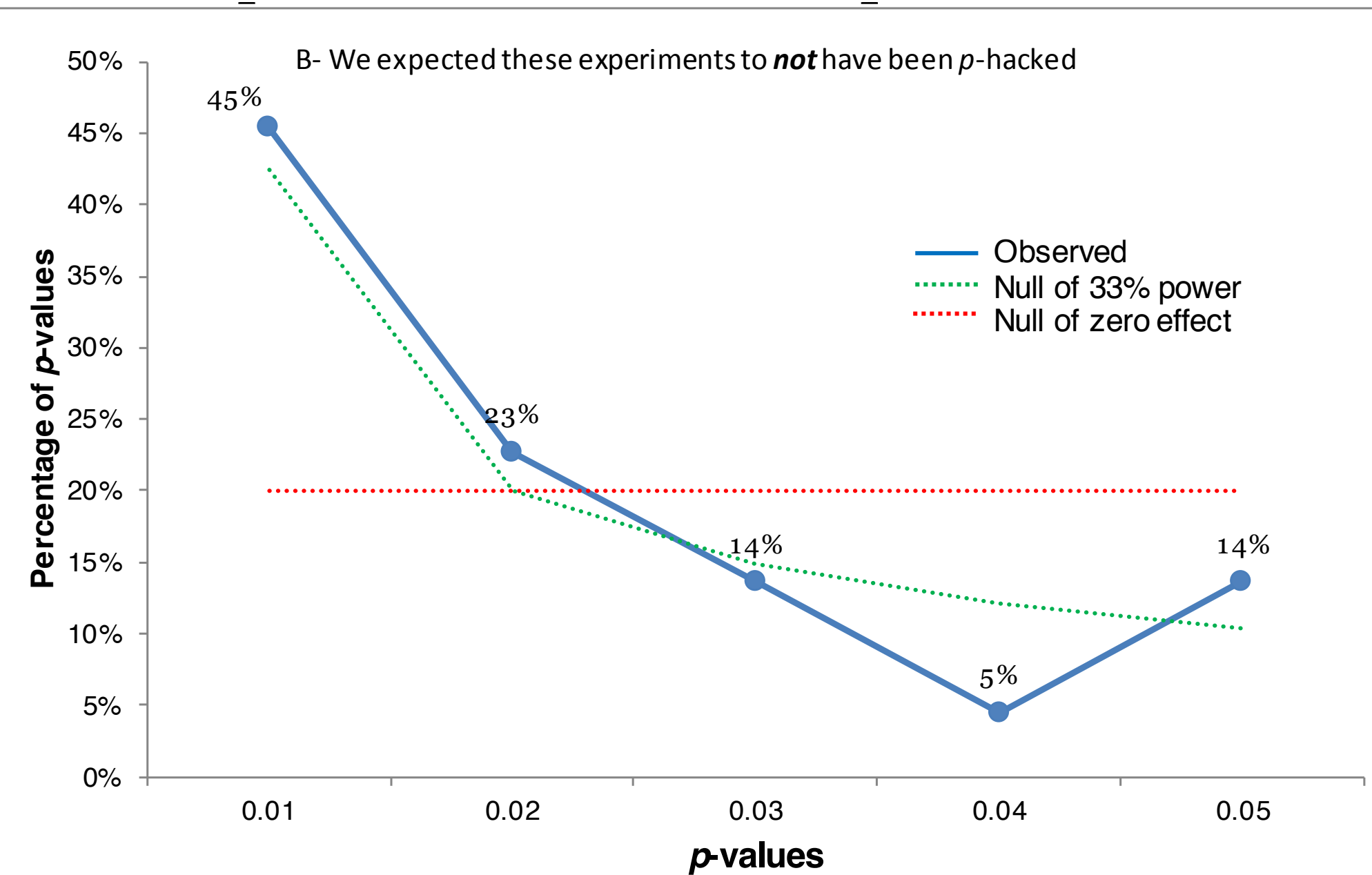
2) Studies lack evidential value
(flatter than 33%)

$\chi^2(40)=82.5, p<.0001$

3) Studies lack evidential value and were intensely p-hacked?
(left-skewed)

$\chi^2(40)=58.2, p=.031$

The observed p-curve includes 20 significant p-values, an additional 3 were $p>.05$
Of those 20 p-values, 3 are $p<.025$, binomial test for right-skew: $p>.999$, left-skew: $p=.0013$



Statistical Inference

1) Studies contain evidential value
(right-skewed)

$\chi^2(44)=94.2, p<.0001$

2) Studies lack evidential value
(flatter than 33%)

$\chi^2(44)=43.2, p=.507$

3) Studies lack evidential value and were intensely p-hacked?
(left-skewed)

$\chi^2(44)=27.2, p=.978$

The observed p-curve includes 22 significant p-values, an additional 3 were $p>.05$
Of those 22 p-values, 16 are $p<.025$, binomial test for right-skew $p=.026$, for left-skew $p=.991$.

Förster, Act 2

- Förster declines prestigious Humboldt fellowship
- Has vision on a mountain



During my work on my new research project on “what having does to being” I changed my approach to life completely. I do not further want to chase after publications as was the rule elsewhere. I rather want to create theories from the breadth of my knowledge. I want to dig deeper.. I would like to inspire others with my work, and would rather like to do all the things that I am really interested in. More than other disciplines, social psychology creates ground breaking theories. This needs time, communication with others, it affords risk taking in thinking beyond trends and pragmatic considerations.

I will spend the rest of my life on BEING rather than on HAVING.

Thus, I will leave the materialistic and soulless production approach in science. And I want to say “Adieu” to 10 cruel years, in which my life was almost completely determined by others. I am going my own way now.



Förster, Act II

- UvA commissions confidential investigation into other works written while at UvA
- Results announced to media; report sent to journals proposing retraction of half a dozen more papers
- Report PKW (Peeters, Klaassen, van der Wiel) uses, **in part**, novel methodology of Klaassen
- R scripts published





Evidential Value in ANOVA-Regression Results in Scientific Integrity Studies

Chris A.J. Klaassen

(Submitted on 18 May 2014 (v1), last revised 19 Mar 2015 (this version, v2))

Some scientific publications are under suspicion of fabrication of data. Since humans are bad random number generators, there might be some evidential value in favor of fabrication in the statistical results as presented in such papers. In case of ANOVA-Regression studies we present the evidential value of the results of such a study in favor of the hypothesis of a dependence structure in the underlying data, which indicates fabrication, versus the hypothesis of independence, which is the ANOVA model assumption. Applications of this approach are also presented.

Comments: 10 pages, 2 tables. arXiv admin note: substantial text overlap with [arXiv:1304.7198](#)

Subjects: **Methodology (stat.ME)**

MSC classes: 62F15, 62P15

Cite as: [arXiv:1405.4540](#) [stat.ME]

(or [arXiv:1405.4540v2](#) [stat.ME] for this version)

<https://pubpeer.com/publications/5439C6BFF5744F6F47A2E0E9456703>

Submission history

From: Chris A. J. Klaassen [[view email](#)]

[v1] Sun, 18 May 2014 19:19:44 GMT (9kb)

[v2] Thu, 19 Mar 2015 13:56:41 GMT (11kb)

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Criticism of Klaassen approach

- Hybrid Bayesian - frequentist
- Some ideas from forensic statistics
- Composite alternative (“fraud”) vs simple null hypothesis (“honest”)
- null hypothesis is point on boundary of alternative
- $V = \max \text{lik}(\text{alternative}) / \text{lik}(\text{null})$ is always at least 1
- KPW seem to accept an alpha of 8% “per study”
- “per paper”, four honest studies already has 40% chance of getting label “low scientific veracity”

Wrong order!



- Do the science, in public, first!
- Only then (perhaps) should management consider taking disciplinary steps...

<https://www.youtube.com/watch?v=yQ5n6EMgPq0>

Where Have All The Flowers Gone?

... When will they ever learn. When will they ever learn.

My advice

- Förster gets his millions from Humboldt
- Research is carefully replicated under tight supervision

And now for something
completely different



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Nijkamp affair

- Thesis defence Karima Kourtit (VU) cancelled at last moment June 2013
- Whistleblower finds data anomalies in more papers also with second circle of co-authors
- Gill requests data May 2014
- Gill publishes anonymous whistleblower report June 2014
- “Blitzpromotie” Karima Kourtit June 2014
- Kourtit and Nijkamp accuse Gill of violation of scientific integrity
- Leiden “CWI” proceedings lead to a “settlement out of court”

Nijkamp affair

- It was about **quality** not about **integrity**
- “Self-plagiarism” issue was a red-herring
- English translation of whistleblower report now nearly complete
- I still didn't get the data
- The co-authors still didn't see the criticism of their work

Conclusions

- R
- Integrity
- Insurance

Good research practices

- Reproducibility
- Literate programming
- Use R!

When will they ever learn?



- Do the science, in public, first!
- Only then (perhaps) should management consider taking disciplinary steps...

<https://www.youtube.com/watch?v=yQ5n6EMgPq0>

Where Have All The Flowers Gone?

... When will they ever learn. When will they ever learn.

Integrity, insurance

- Let's get away from the shaming, witch-hunts, personal integrity issues
- It's about **professionalism** and **professional ethics**
- I hope you will think about it ...