Lecture 6: Lab in Human Cognition

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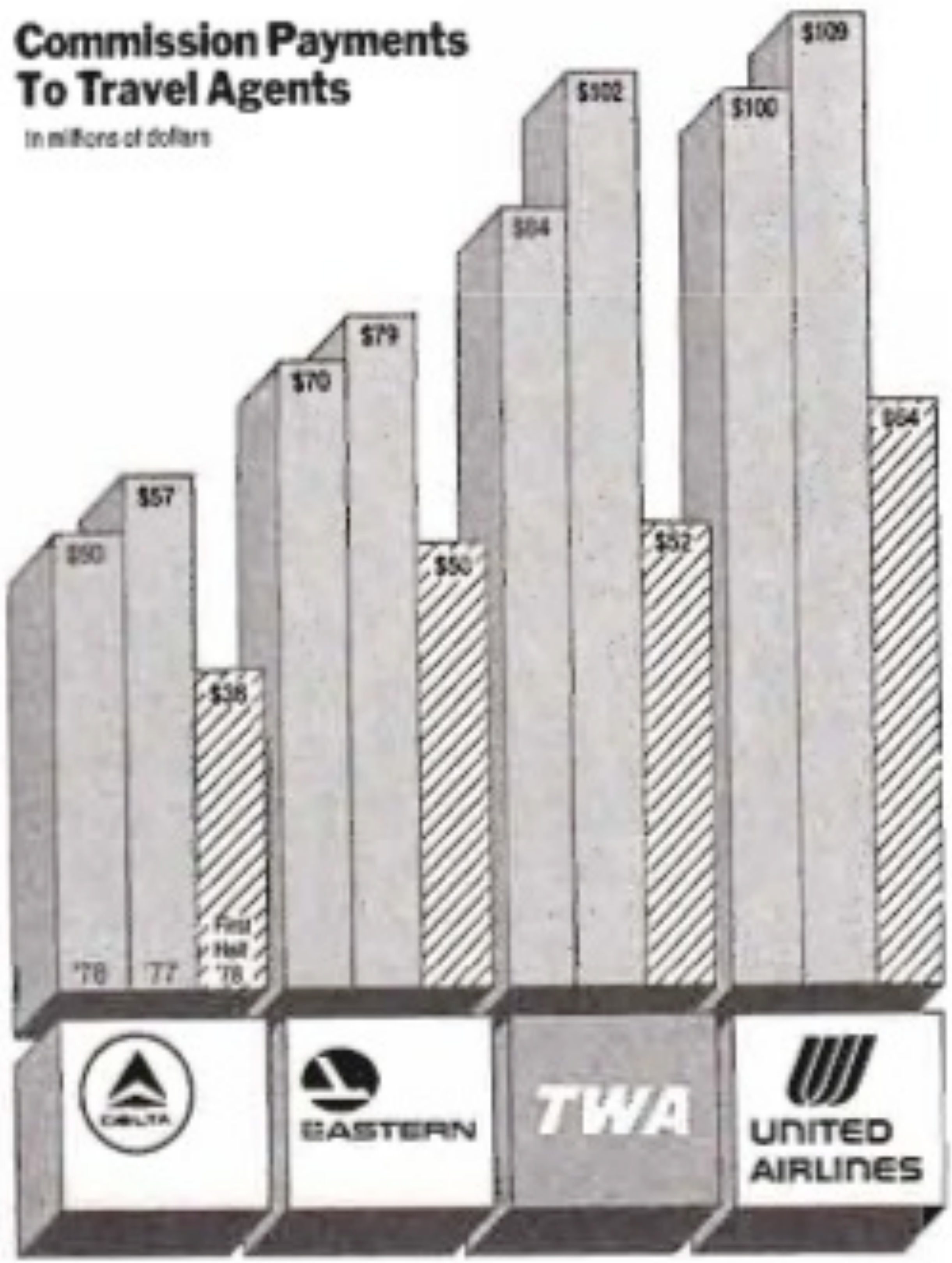
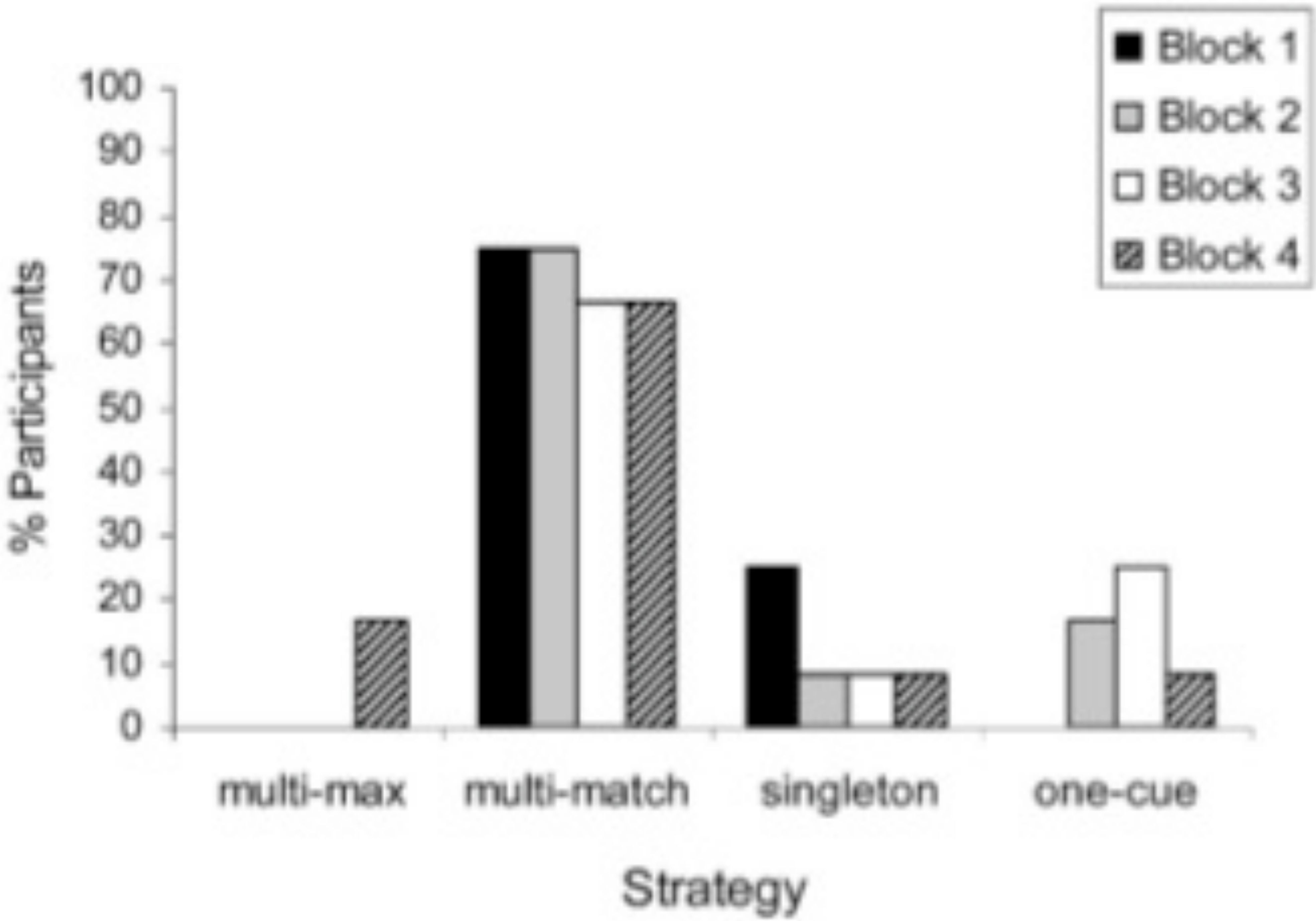
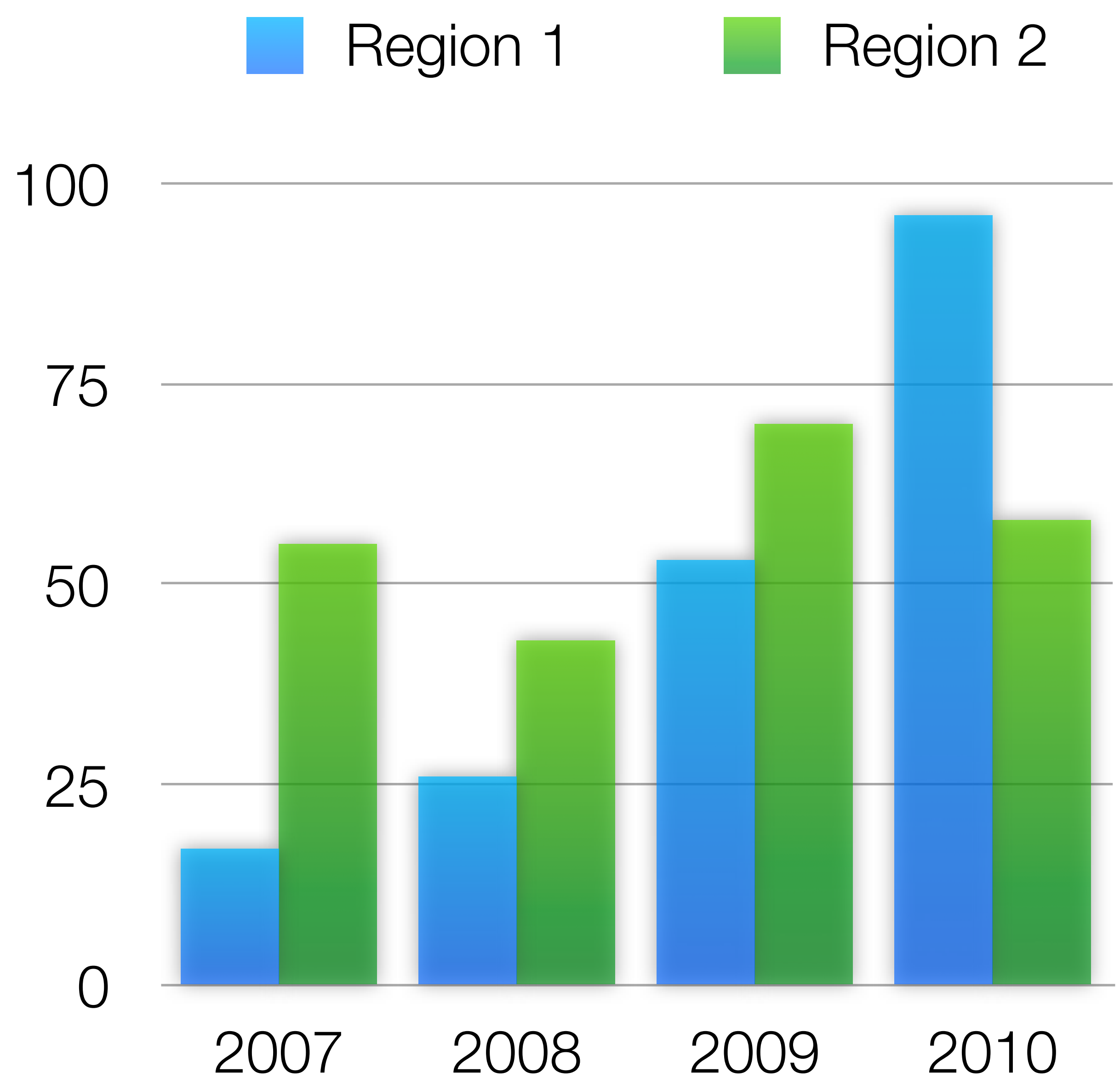
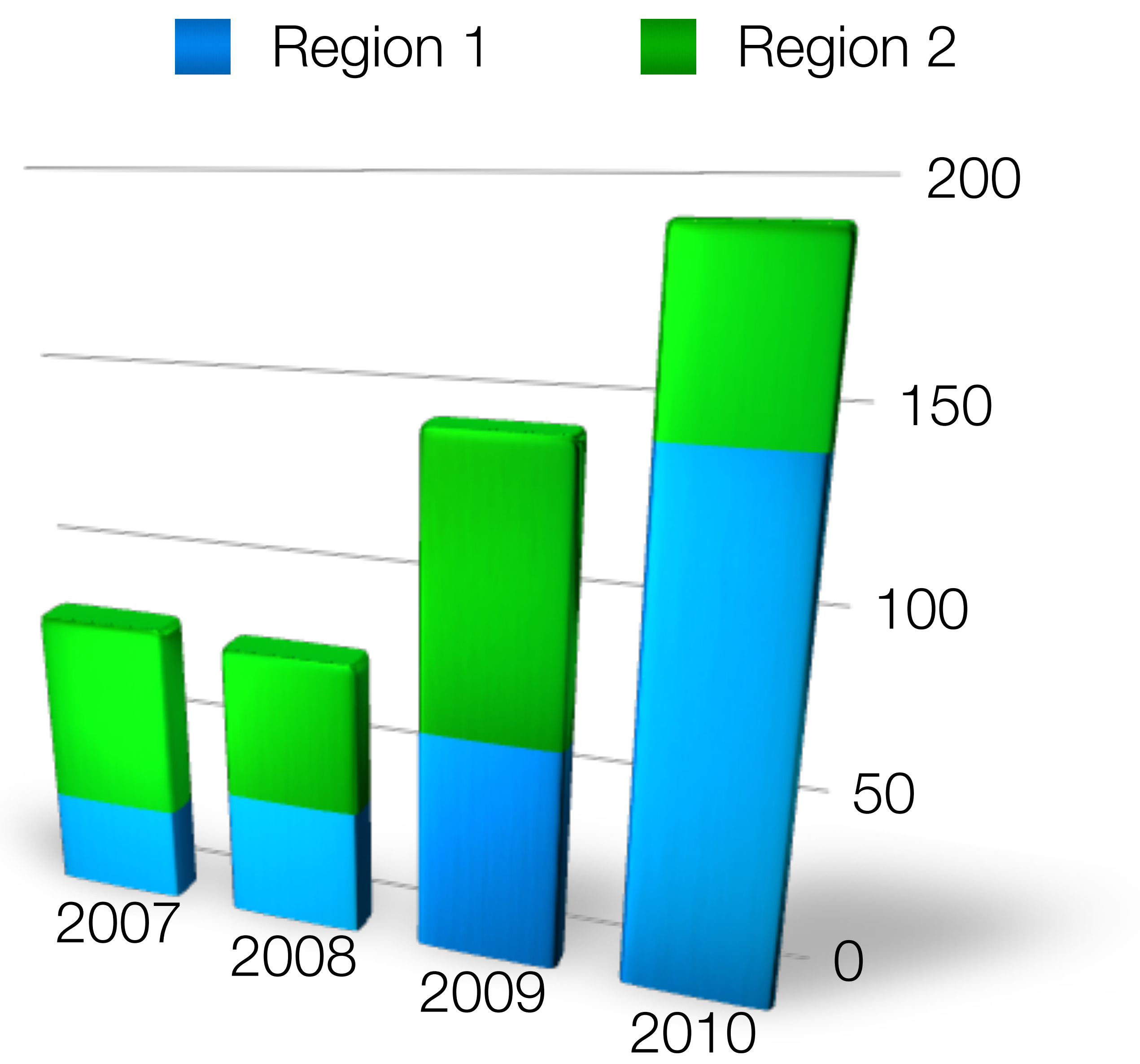
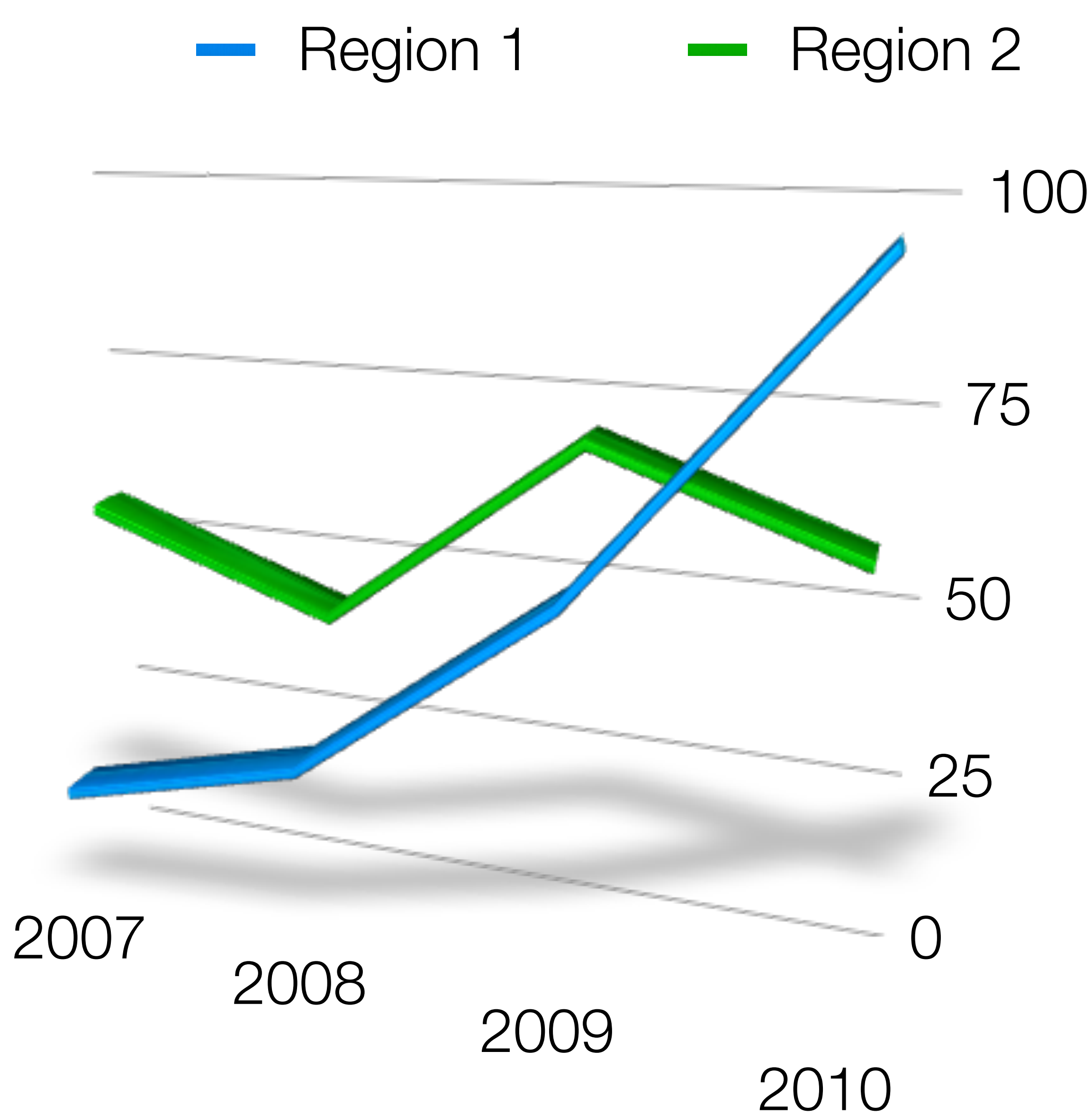
First
Charts and Graphs

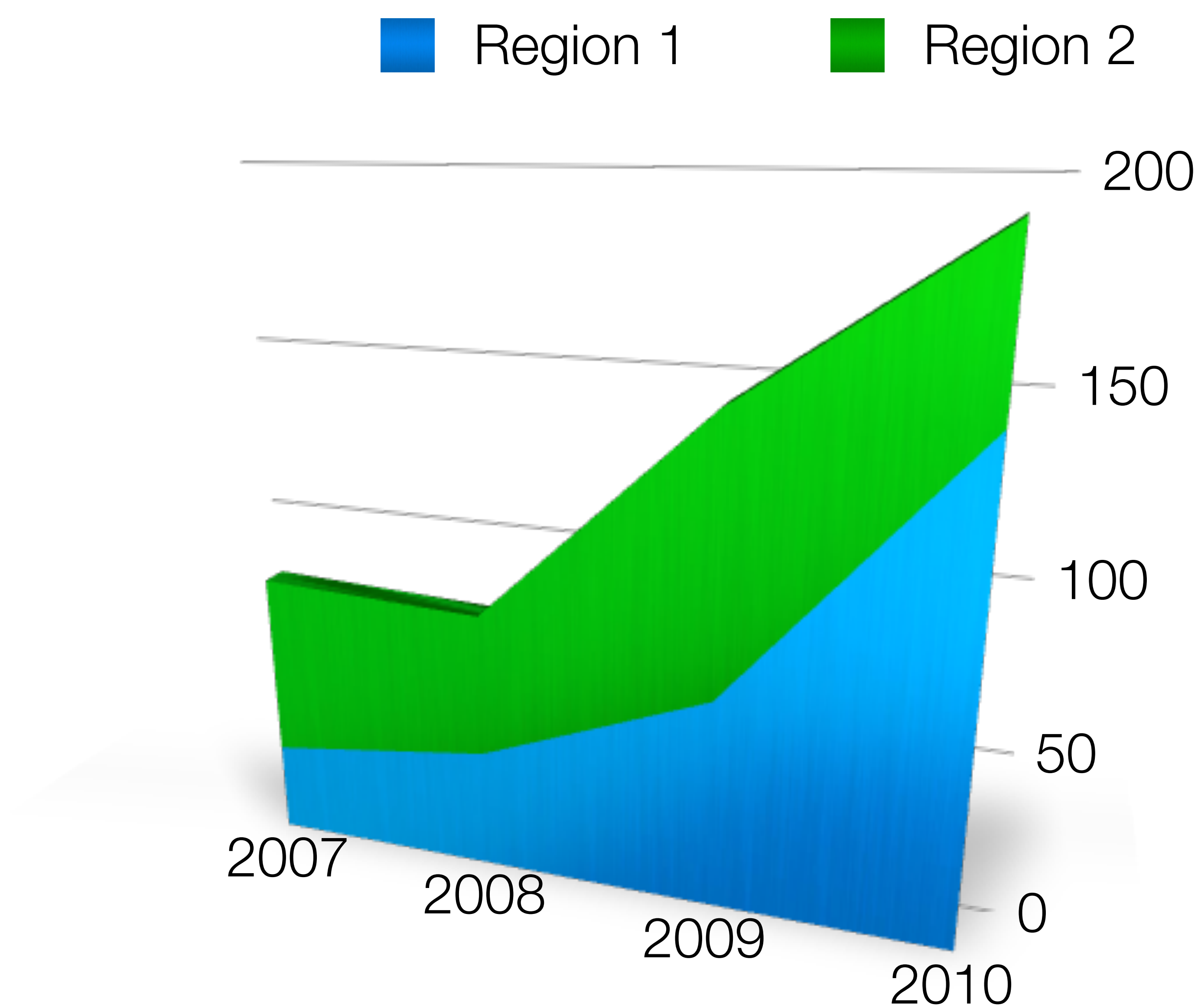

Commission Payments
To Travel Agents
in millions of dollars
$50
$57
$36
'76
'77
First
Half
'78
$70
$79
$50
$84
$102
$52
$100
$109
$64
DELTA
EASTERN
TWA
UNITED
AIRLINES


Block 1
Block 2
Block 3
Block 4
100
90
80
70
60
50
40
30
20
10
0
% Participants
multi-max
multi-match
singleton
one-cue
Strategy


Region 1
Region 2
100
75
50
25
0
2007
2008
2009
2010


Region 1
Region 2
200
150
100
50
0
2007
2008
2009
2010


Region 1
Region 2
100
75
50
25
0
2007
2008
2009
2010


Region 1
Region 2
200
150
100
50
0
2007
2008
2009
2010

Three major types

Lines

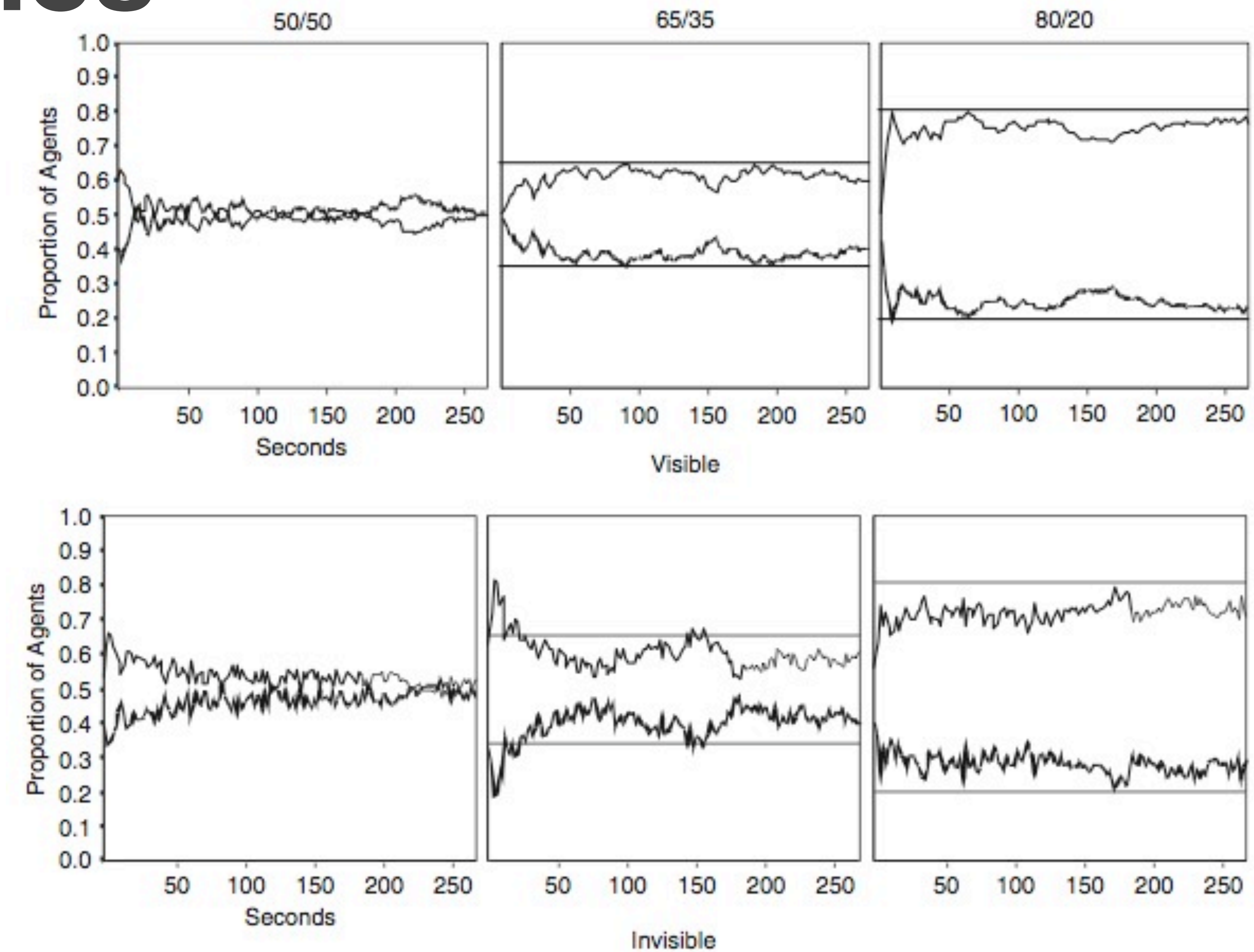
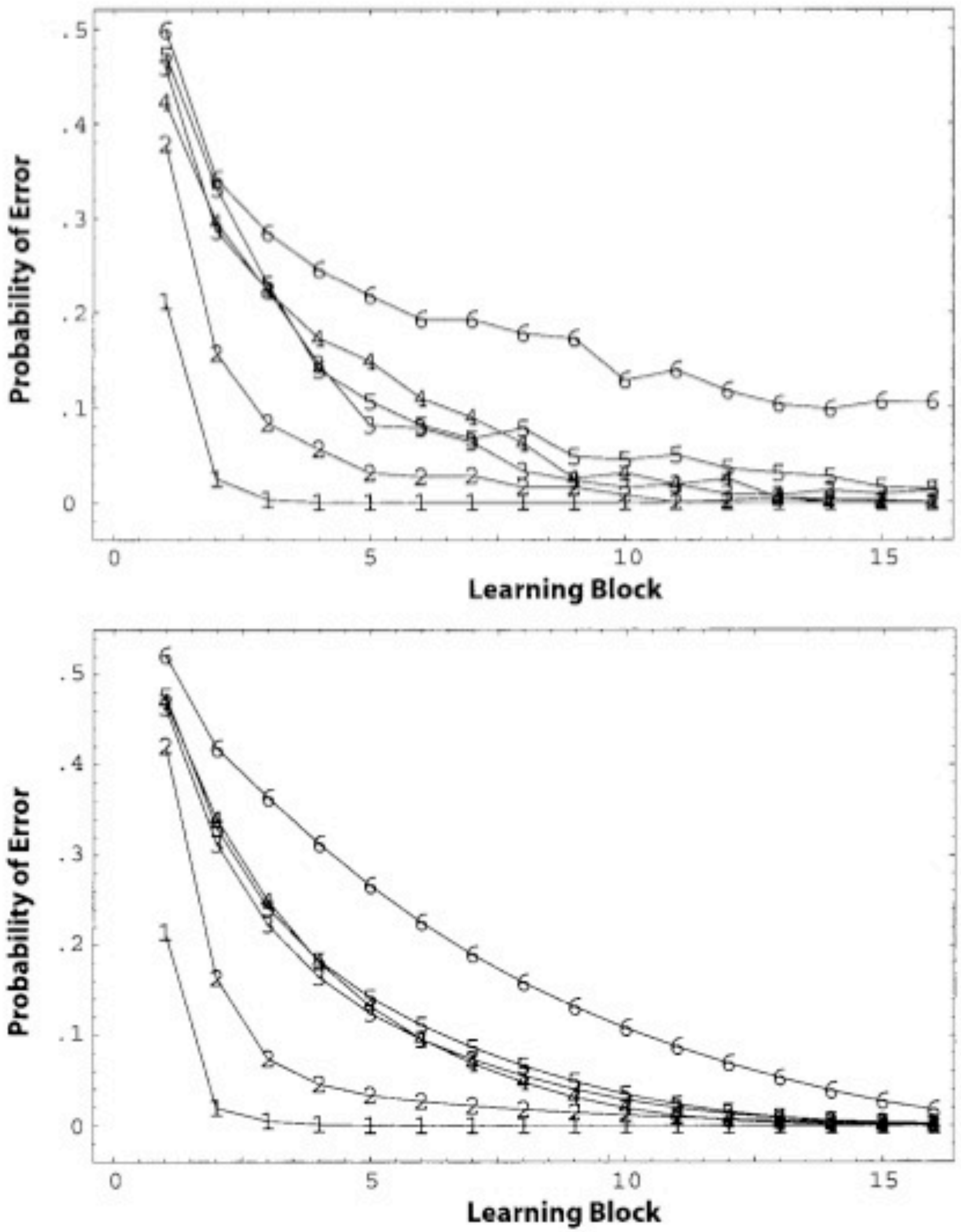


Fig. 1. Changes in the number of people at each of two resource pools across 270-second foraging experiments (Goldstone & Ashpole, 2004). Resources were distributed evenly (50/50) or with unequal (65/35 or 80/20) distributions. Participants either were shown the positions of other participants and resources (visible) or not (invisible). The actual distributions of resources (indicated by the straight horizontal lines) are more extreme than the distributions of participants to these resources.

Lines


Probability of Error
Learning Block
.5
.4
.3
.2
.1
0
5
10
15
Probability of Error
Learning Block

Lines

Quantitative dependent variable vs. Quantitative independent variable

Bars

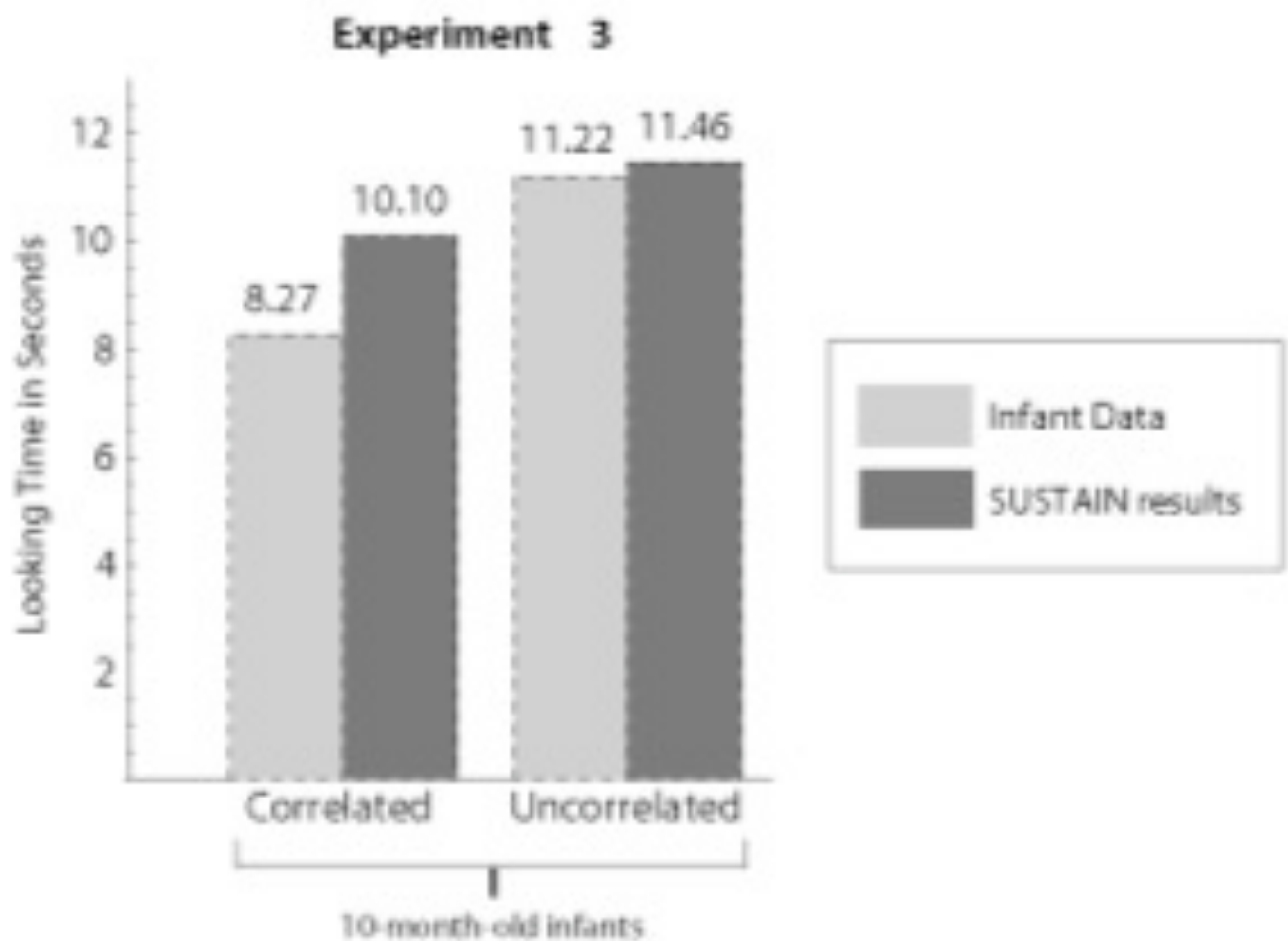


FIGURE 2 A comparison of the infant looking times and SUSTAIN's predicted looking times.

Bars

Quantitative dependent variable vs. Qualitative independent variable (i.e., different conditions in an experiment)

Dots (plus lines)

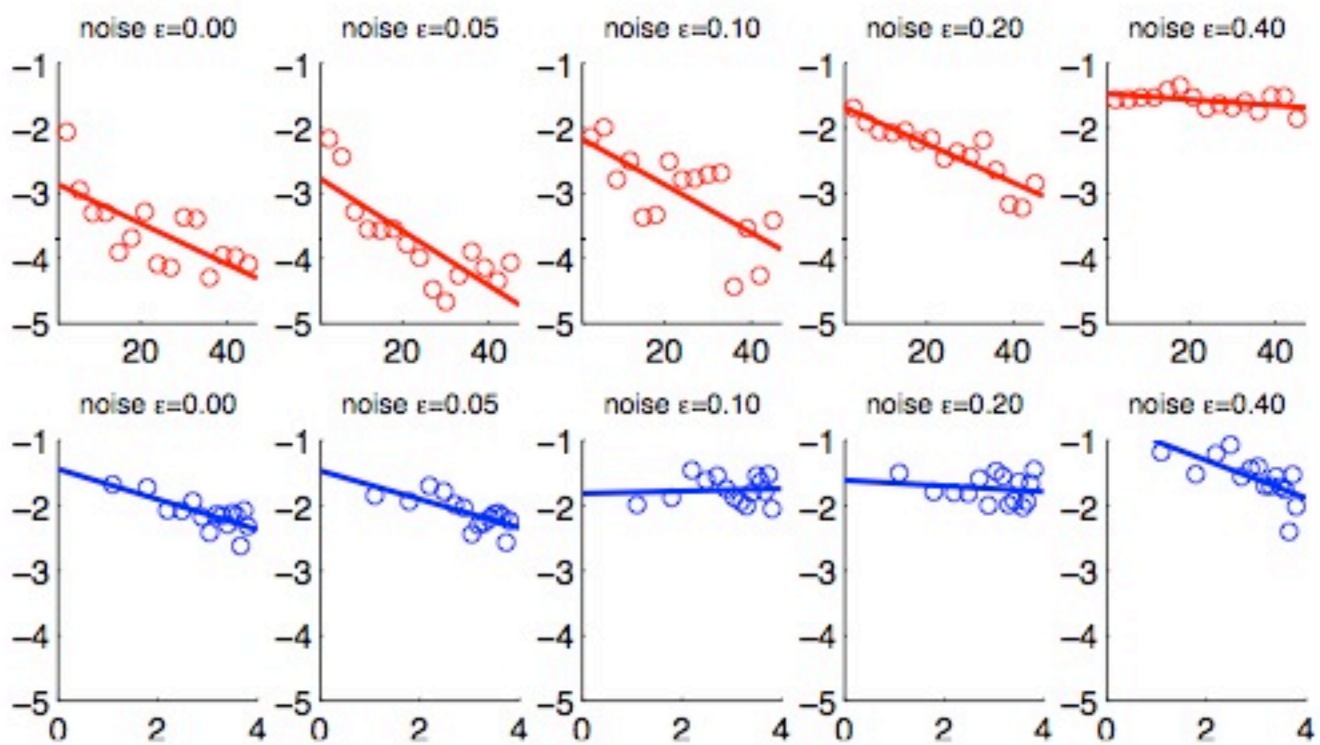


Figure 6: **(Upper)** Human active learning decreases error exponentially, as indicated by the linear distribution of $\log(|\hat{\theta}_n - \theta|)$ (the y-axis) versus n (the x-axis). **(Lower)** Human passive learning in the Random condition is slower than $O(1/n)$, since the slopes are shallower than -1 on $\log(|\hat{\theta}_n - \theta|)$ (the y-axis) versus $\log(n)$ (the x-axis).

Dots (plus lines)

Two continuous variables plotted against each other (most often to assess correlation between variables)

Reminder about error bars

ALWAYS include error bars when you can!

Error bars illustrate the uncertainty in the measurement (the bar height shows the mean, the error bars show the range of values that might have actually happened)

What should they show?

- Standard deviation?
- Standard error? (+/- 1 standard error, ~85% confidence interval)
- 95% confidence interval? (+/- 1.96*standard error)

Standard Error Bars

- If overlap means no significant difference
- If DON'T overlap, unsure. As our exercise showed it is possible to get them to not overlap but still be significant.

95% CI Error Bars

- If overlap unsure, could be significant or not
- If DON'T overlap, definitely significant at .05 level

Which should I use?

- Either ok. Most people in psychology prefer standard error. Keep in mind when interpreting graphs though that the meaning of the error bars can trick you!

Second

Scientific writing (like any intellectual creative work) is very hard

Collaray

You (and I) are not as good as we could be, and maybe are even bad at it

The Good News

The only way to get good at communicating your ideas is to practice

My problem is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals. This number assumes a variety of disguises, being sometimes a little larger and sometimes a little smaller than usual, but never changing so much as to be unrecognizable. The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution.

Miller (1956) "The magical number seven, plus or minus two: some limits on our capacity for processing information" *Psychological Review* 63, 81-97.

1. Introduction

Similarity serves as factotum to cognition. Memory traces are activated according to their similarity to probes (Hintzman, 1986). Objects are categorized according to their similarity to category exemplars (Medin & Schaffer, 1978; Nosofsky, 1986, 1992) or category prototypes (Posner & Keele, 1968; Reed, 1972; Rosch & Mervis, 1975). Decisions may be based on the similarity of the situation that would result from a choice to an ideal situation (Medin, Goldstone, & Markman, 1995). Strategies used to solve previous problems are applied to new problems that are similar (Bassok, 1990; Kolodner, 1993; Novick, 1988, 1990). The strength of an inductive argument depends on the similarity of the target of the argument to the base of the argument (Osherson, Smith, Wilkie, Lopez, & Shafir, 1990).

Two of the most influential approaches to similarity are spatial approaches and feature-set approaches. Spatial approaches, as exemplified by multidimensional scaling (Shepard, 1962a, 1962b), define similarity as inversely related to the distance between stimuli in a dimensionally organized metric space. Feature-set approaches, as exemplified by Tversky's

withheld

Third

Look at example paper