A HARD RAIN'S A-GONNA FALL: TEACHING STATISTICS FOR THE SOCIAL SCIENCES

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- Social science module
  - 3 obligatory
  - 2 elective
  - other courses too
- Module is shaped to meet professional needs of those with Social Science background

Pain in the Brain

- Mainly psychologists…
- *Mental health* worries?

  Statistics without tears

  Survival guide

  The Complete Idiot's Guide

  Statistic's hell

  …

- *Trained monkeys* syndrome?

  Armstrong (1967)

  Tom Swift's FA Machine

  Gigerenzer (1991)

  Statistics' heuristics

  Maxwell (2004)

  Underpowered studies

  Nieuwenhuis et al. (2011)

  Erroneous studies

  …

Two sides of a story…

- Professionals do have resources on their disposal
- They lack interest and genuine *drive* to understand (dig deep)
- Outcome: bad data + bad statistics
- In many occasions they can only inform that there are some eggs, flower, milk,… (counts, percentages, …)
- No crème brulee, however!

Tanja…

Attitudes towards statistics

- Usually negative
- They can affect
  - students 'achievement in learning statistics
  - teaching process
  - later, professional standards

Measurement

- Measuring statistics anxiety
  - Statistical Anxiety Scale - SAS (Vigil Colet et al., 2008)
- Measuring several aspects of attitude
  - Attitudes Toward Statistics - ATS (Wise, 1985)
  - Survey of Attitudes Toward Statistics - SATS (Schau et al., 1997)
- Some shortcomings of available instruments
  - somewhat unclear factor structure
  - factor structure depending on data sample characteristics

OPS scale

- Based on students brief comments on statistics

- 31 items - five-point Likert-type

- OPS = Attitude Toward Statistics (in Serbian)

- Forms for male and female subjects
  - difference in grammatical gender

Method

- Sample
  - 314 students of psychology and sociology from Faculty of philosophy in Novi Sad
  - Majority was psychology students (67%) and female students (87%)
- Data analysis
  - Factor structure
  - Relation with other variables (field and year of study, gender…)

Results

Factor structure

- Internal consistency of the items: standardized Cronbach α=.93
- The first principal component explains 37% of total variance
- 3 factors (Scree and interpretability)
- PCA, Varimax rotation

Results

Factor 1: Affective component

Item	r
Statistika mi se dopada. / - **like statistics**	0.81
Bilo mi je zanimljivo da učim statistiku. / - **interested in learning statistics**	0.80
Više mi je prijalo da učim statistiku nego druge predmete. / - **rather learn statistics than other subjects**	0.78
Osećam odbojnost prema statistici. / - **forbidding**	-0.76
Statistika mi je dosadna. / - **borring**	-0.75
Na časovima statistike sam obično bila dobro raspoložena i orna za rad. / - **cheerful and active on classes**	0.69
Dosta mi je statistike za ceo život. / - **sick of statistics**	-0.67
Statistika je za mene jedna užasna stvar. / - **a terrible thing**	-0.65

Results

Factor 2: Difficulty

| Item	r
Da bi se savladala statistika potrebna je retka vrsta sposobnosti. - **needs a rare kind of ability**	.70
Statistika je previše komplikovana. - **too complicated**	.66
Statistika nije tako teška kao što se priča. - **not so hard as they sey**	-.62
Statistika zahteva poseban način učenja i razmišljanja. - **requires a special method of learning and thinking**	.60

Results

Factor 3: Value / Usability

| Item	r
Uz poznavanje statistike lakše se prate novosti iz struke. **- get news about field of interest**	0.70
Bez poznavanja statistike ne može se postati stručnjak u poslu kojim želim da se bavim. / **- to become good in proffession**	0.70
Statistika se ne koristi samo u nauci nego i u svakodnevnim životu. **- useful in everyday life too**	0.55
Korist od statistike nije vredna vremena i truda uloženog u njeno učenje. / **- not worth of time and efforts**	-0.49
Na studijama ima više statistike nego što će mi zaista biti potrebno. / **- more statistics on studies than it is necessary**	-0.45

Distributions of the answers

Average sum of scores on variables representing factors

Box Plot
Median; Box: 25%-75%; Whisker: Non-Outlier Range
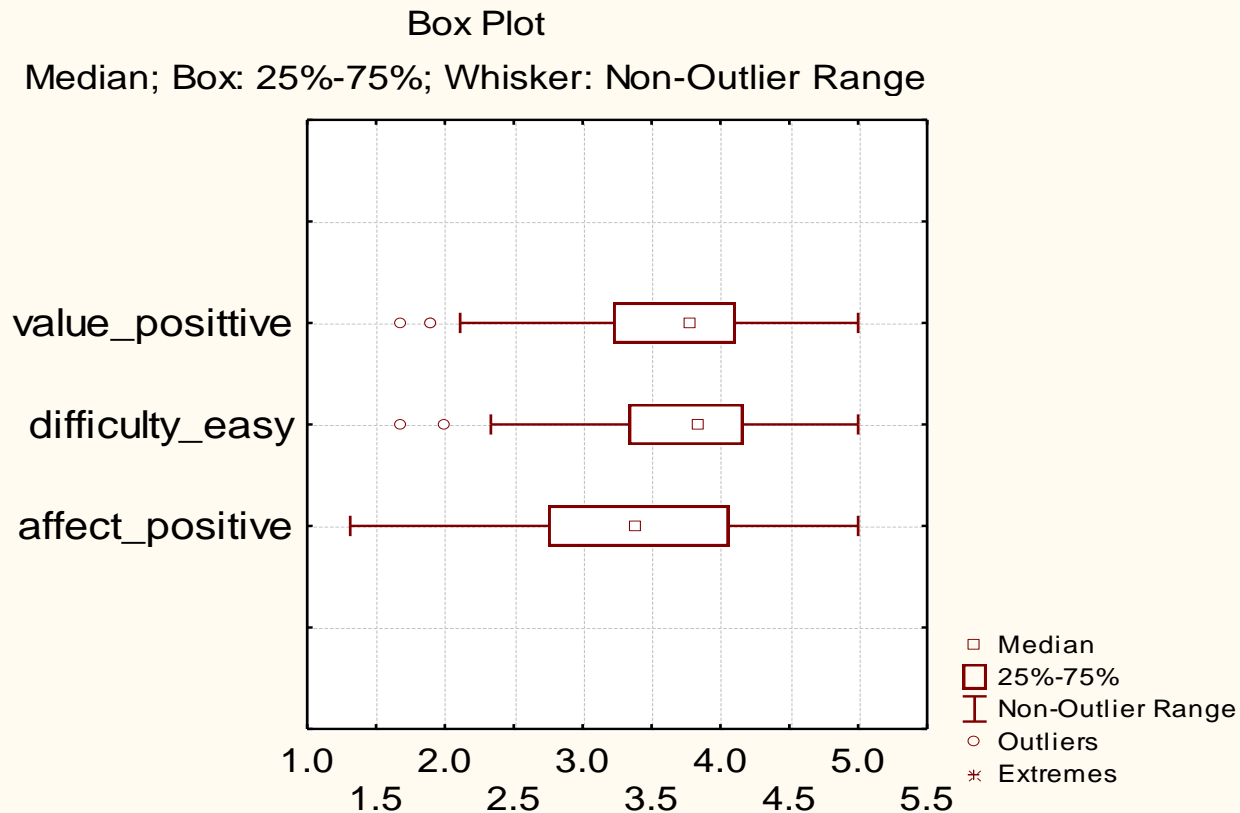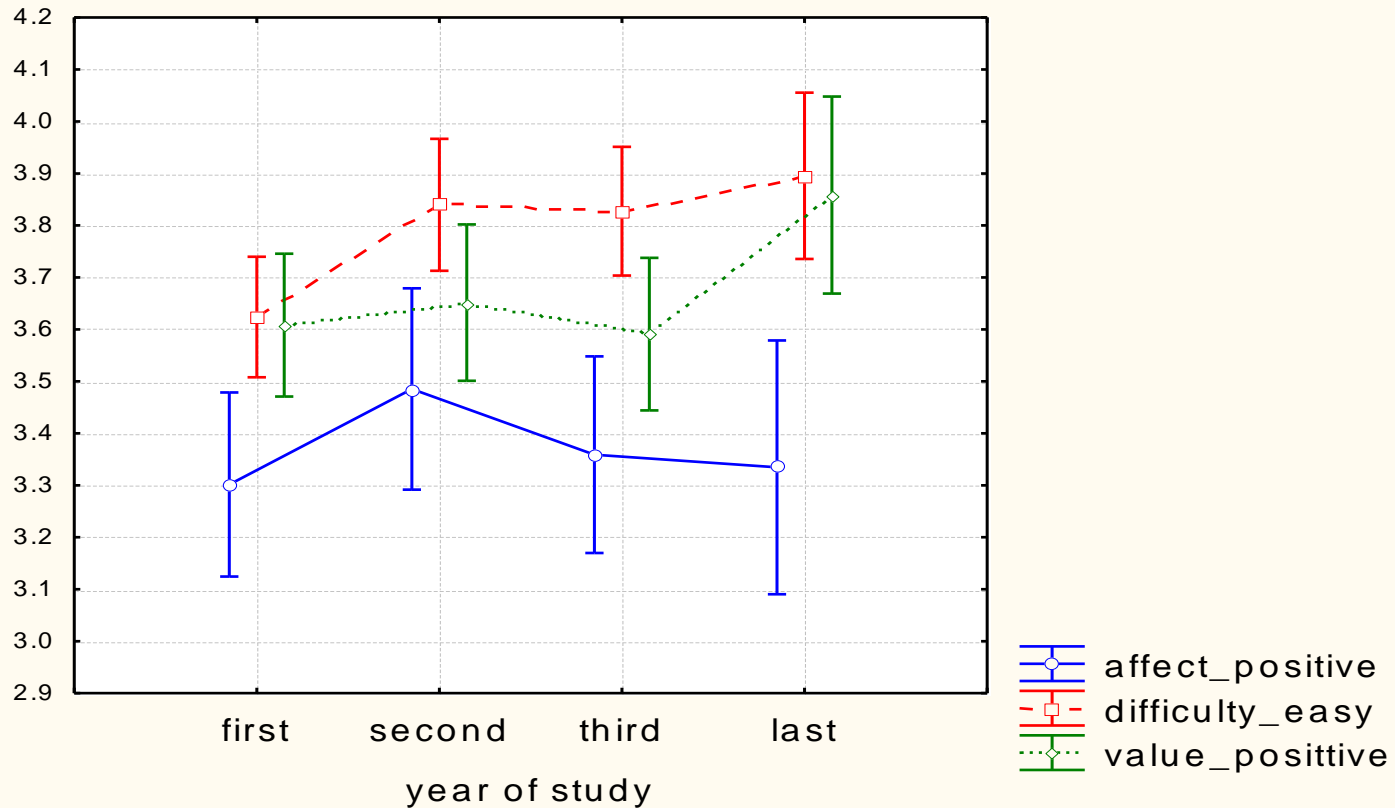
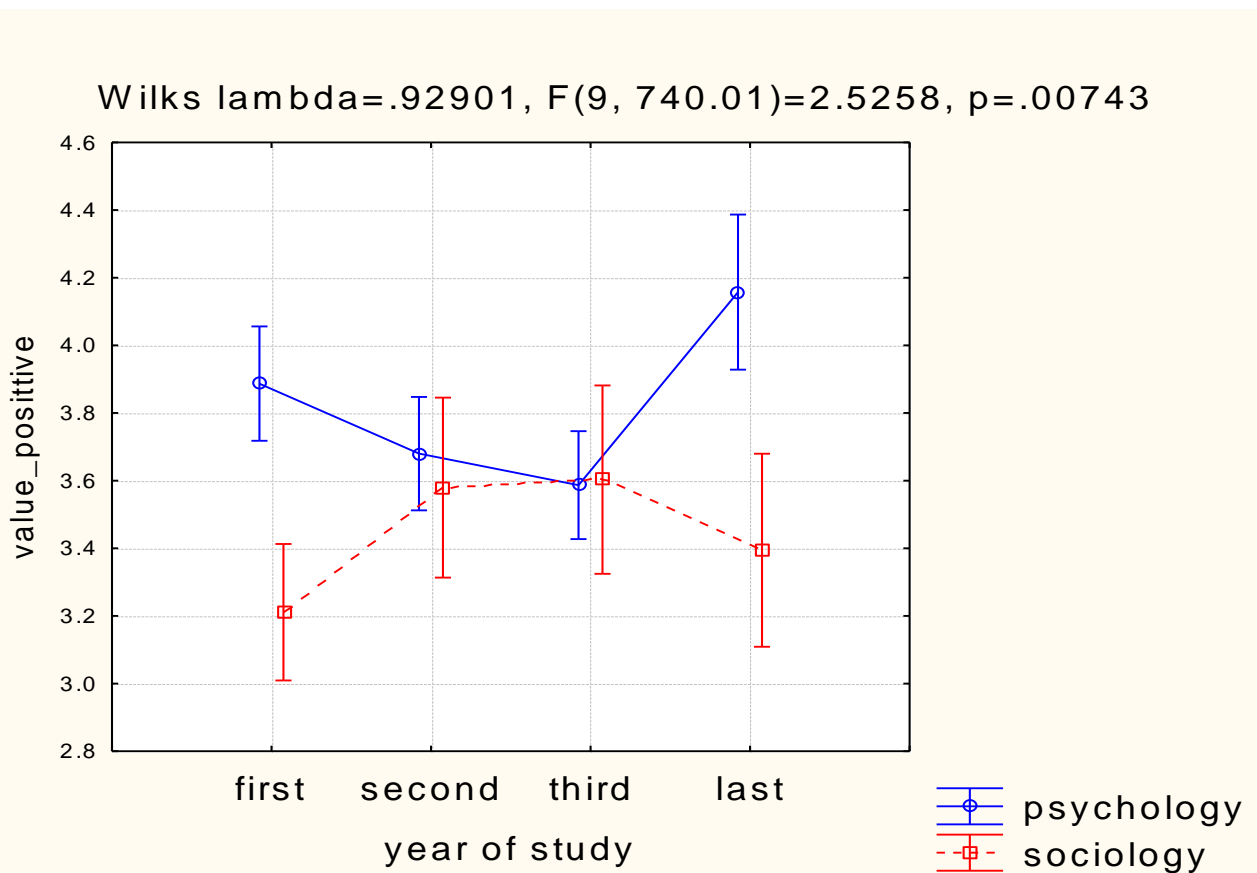# Differences

Field of study (MANOVA)
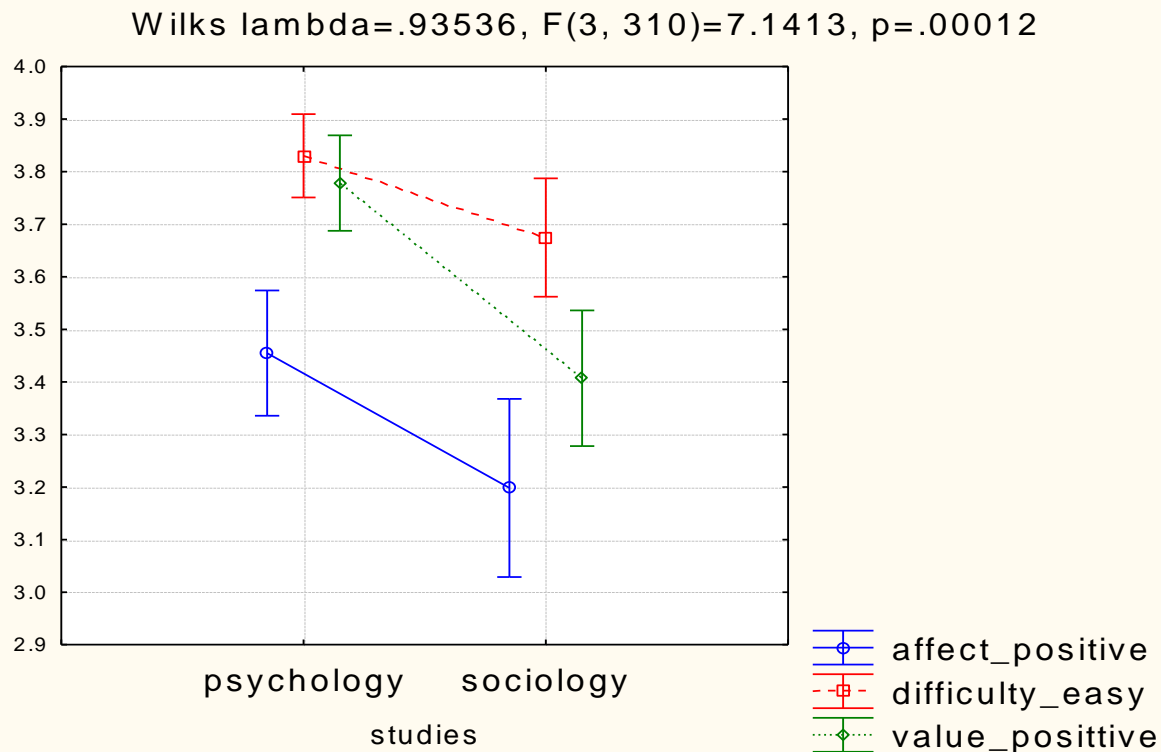
Differences

Year of study (MANOVA)

Wilks lambda=.92507, F(9, 749.74)=2.7091, p=.00414

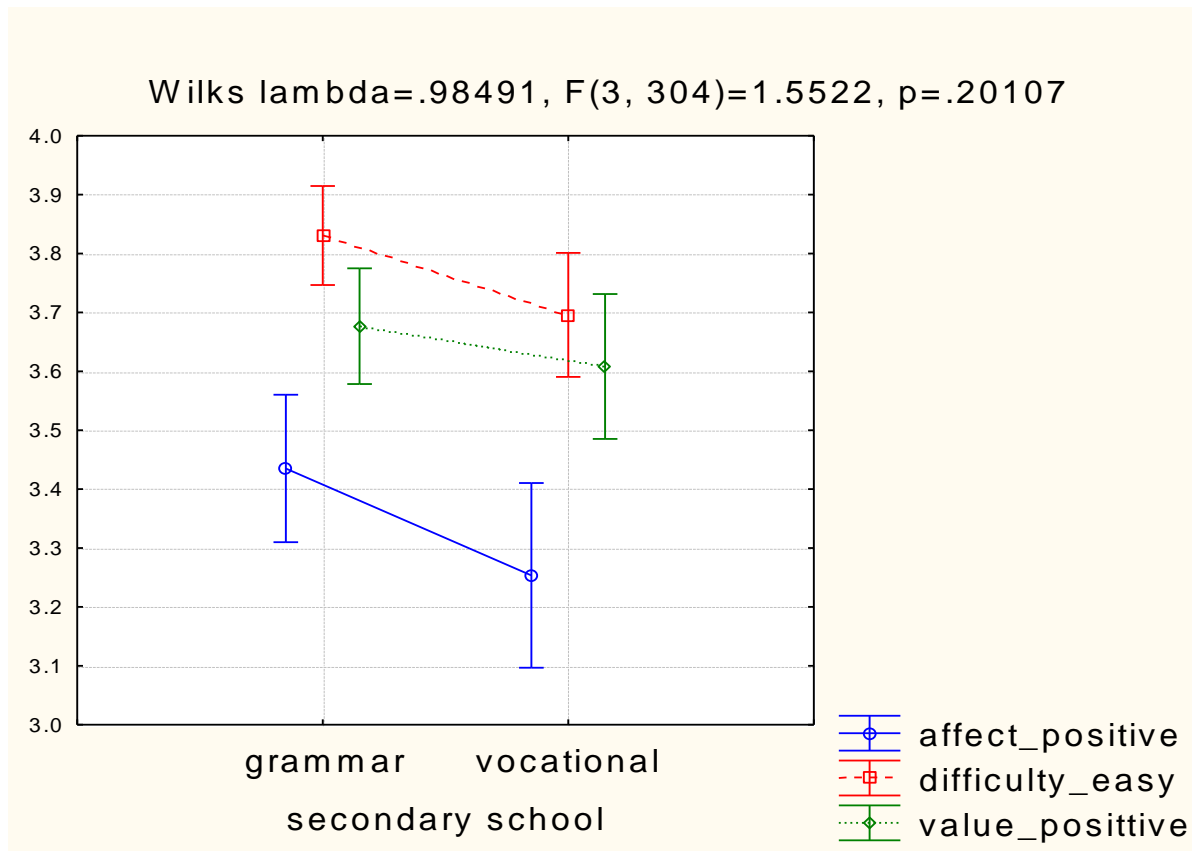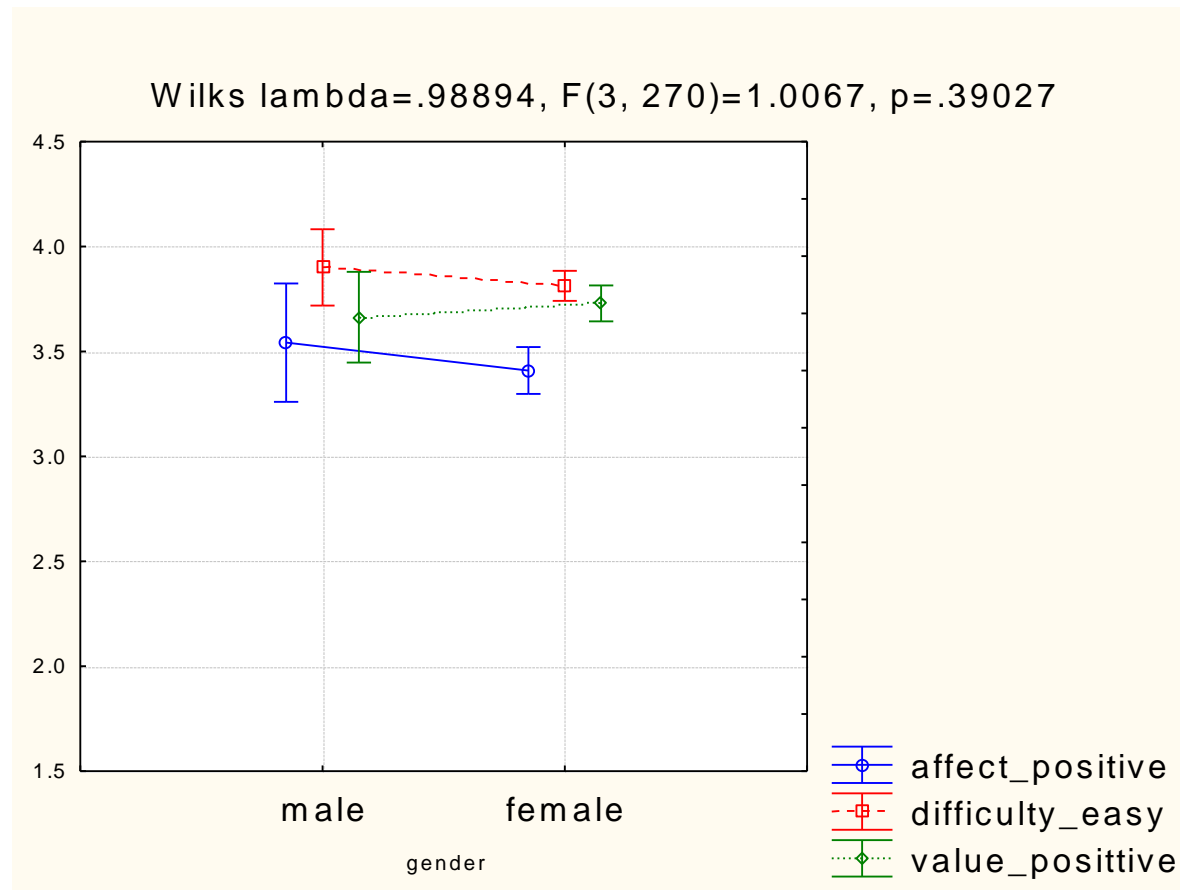# Effects on Value component

Field and year of study interaction effect

Wilks lambda=.92901, F(9, 740.01)=2.5258, p=.00743

Differences

Secondary school education (MANOVA)

Differences

Gender differences (ANOVA)

Relations

…between components of attitudes

- □ relatively high: between .50 and .60
- □ attitudes about value and difficulty of the subject are in relation with emotional attitude

…between components of attitudes and exam results

- □ positive emotions and good exam results

	stat exam (β)
emotions	.42
difficulty	-.04
value	-.03

Conclusions

- Importance of generating positive affect towards statistics
  - to improve teaching process
    - Create a problem solving atmosphere
  - to improve students' achievement and better use of statistical knowledge

Thanks for your attention!