

Freies Wahlfach

Research Methodologies –  
Empirical-quantitative methods

Thomas Wagner

Why quantitative research  
and stats?

Why quantitative research and stats?

*Ich glaube nur der Statistik,  
die ich selbst gefälscht habe*



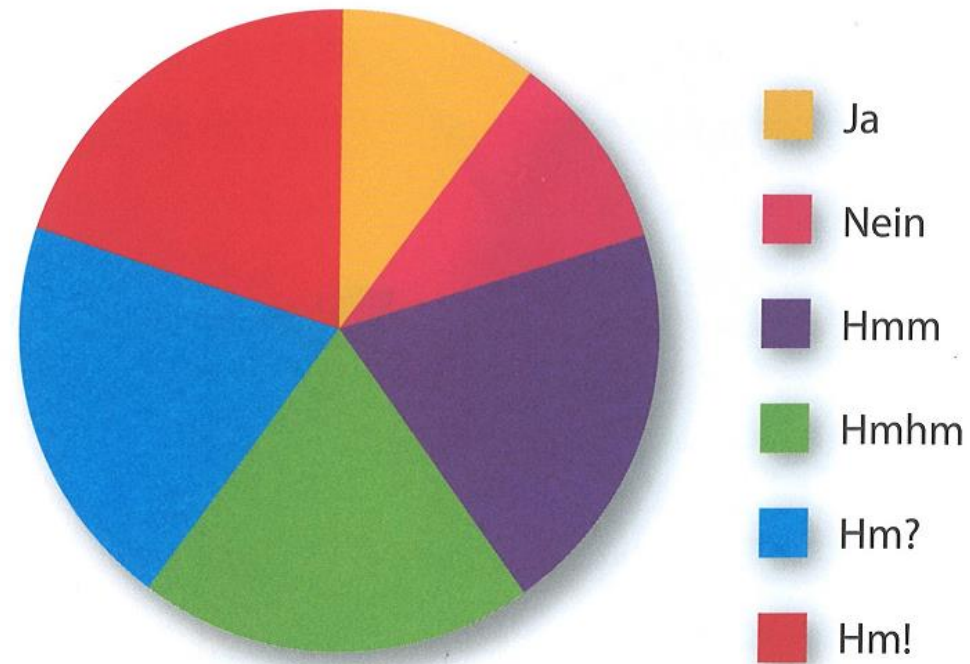
# Why quantitative research and stats?

- where is the truth?
  - introspection ?
  - observation ?
  - modelling ?
  - theorising ?
  - evidence ?
  - [...]



# Why quantitative research and stats?

Die beliebtesten Antworten von Männern

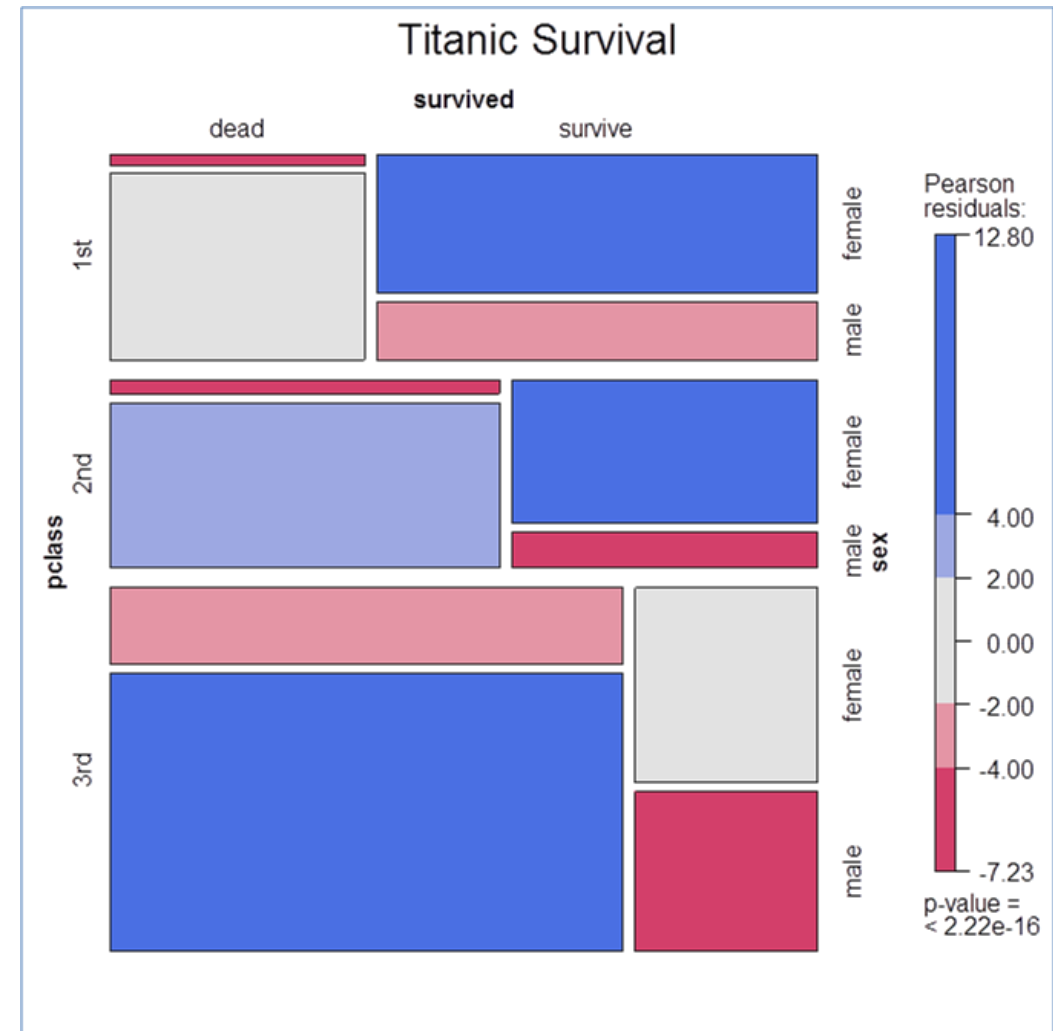


# Quantitative research in general



14. April 1912, 23:40 Uhr

- 1.495 dead passengers
- is passengers' class a factor?

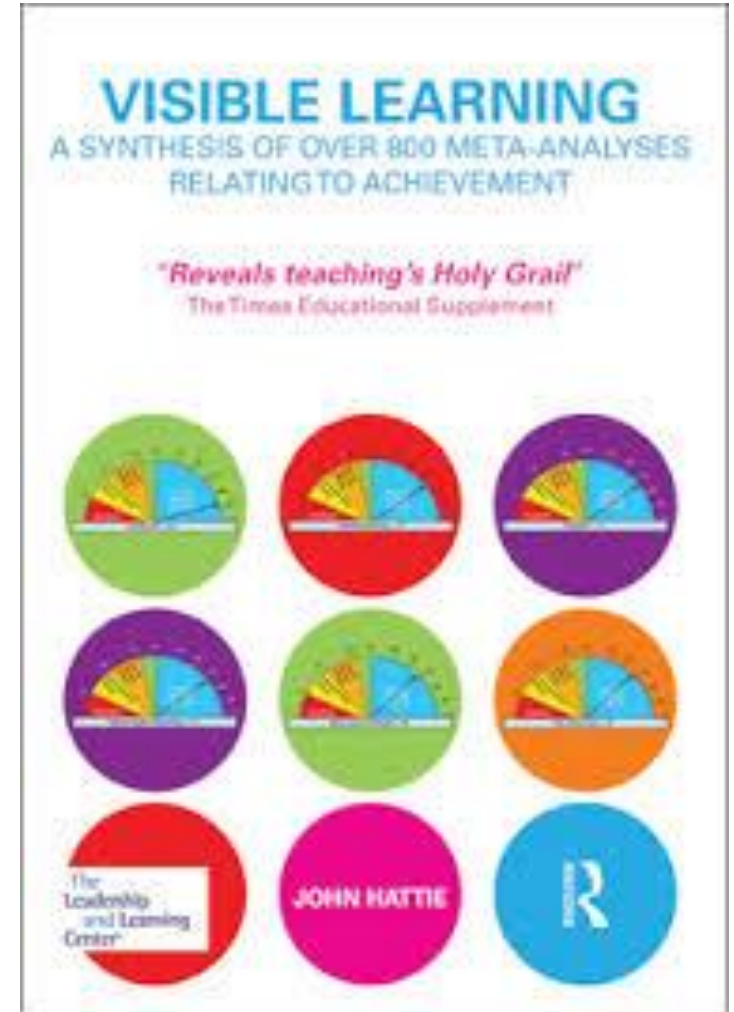
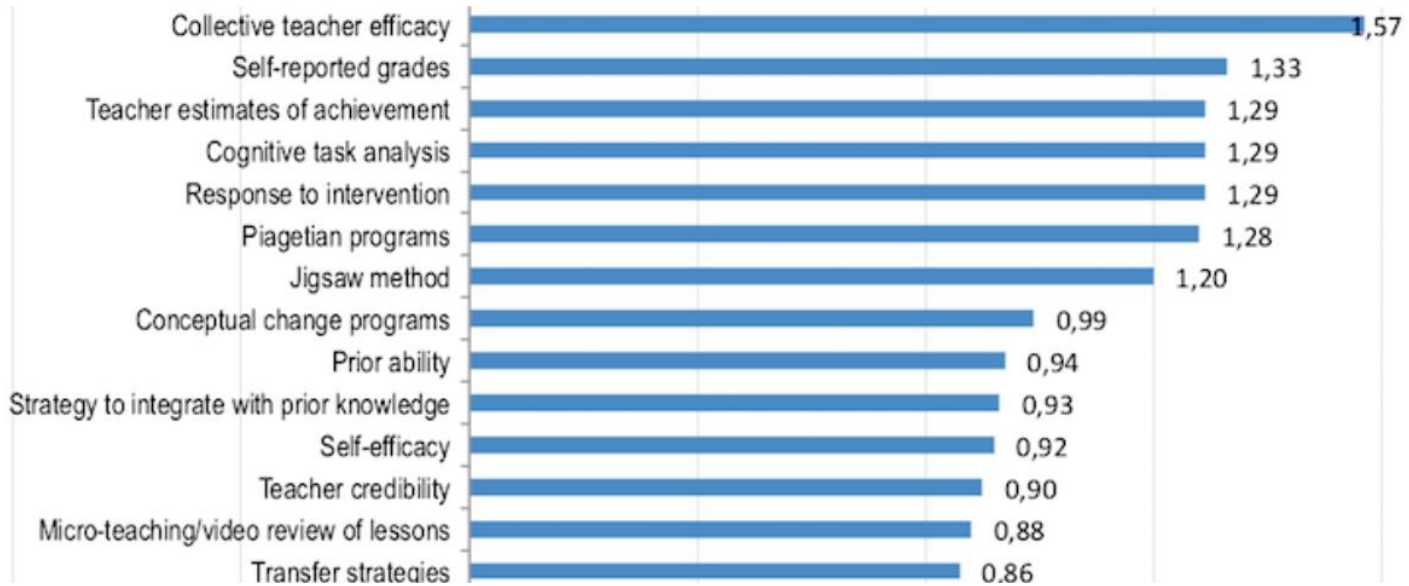


Why quantitative research  
in EFL?

# Quantitative research in education

## The Hattie-study and effect sizes

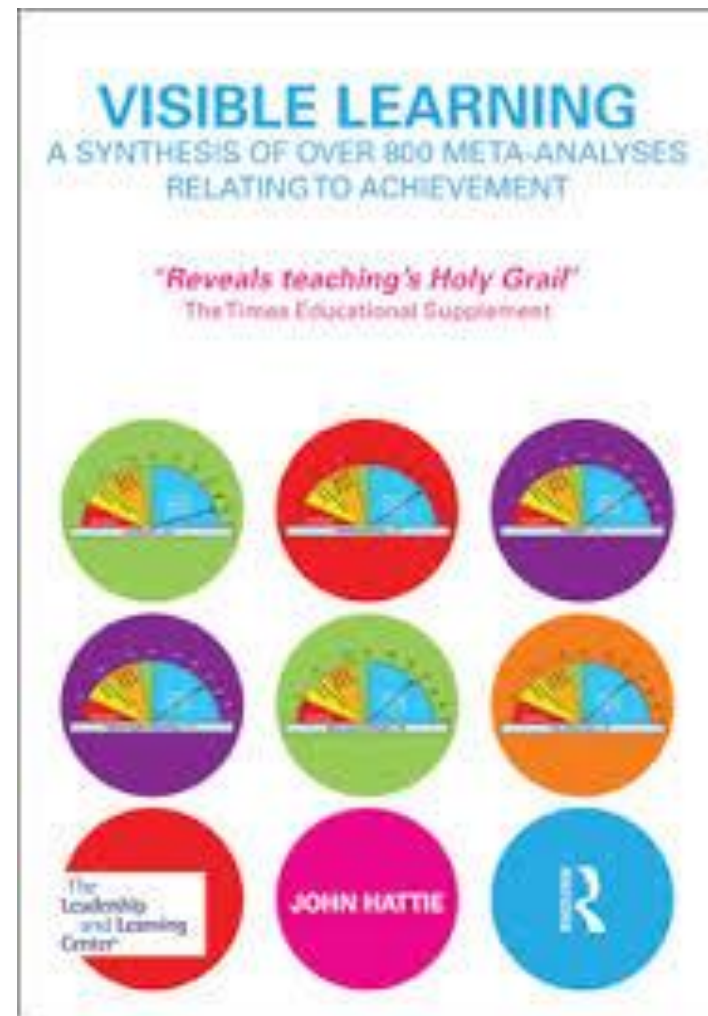
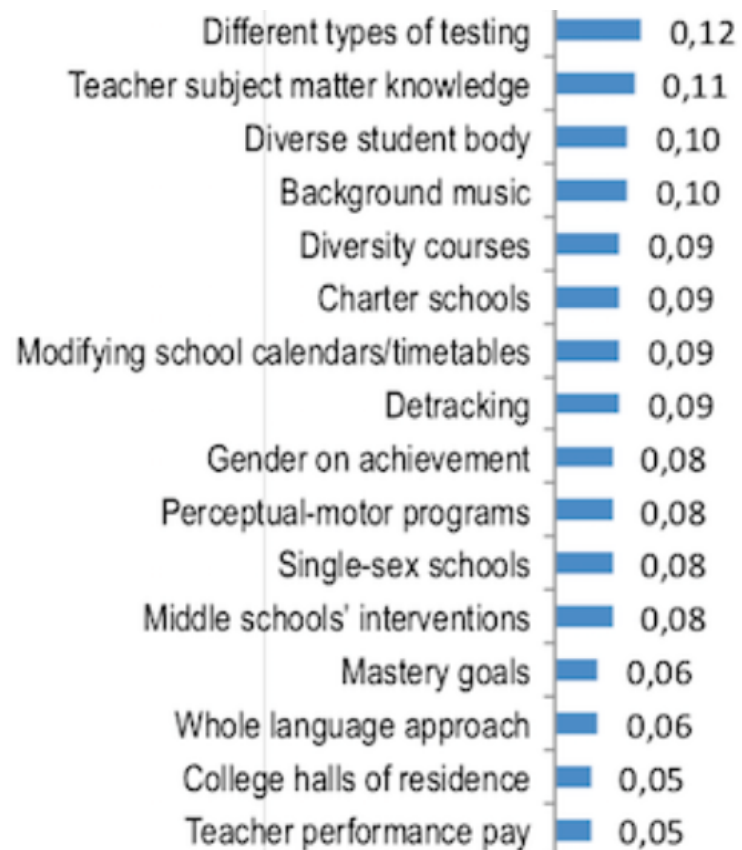
- $d = 0.01$  for open learning



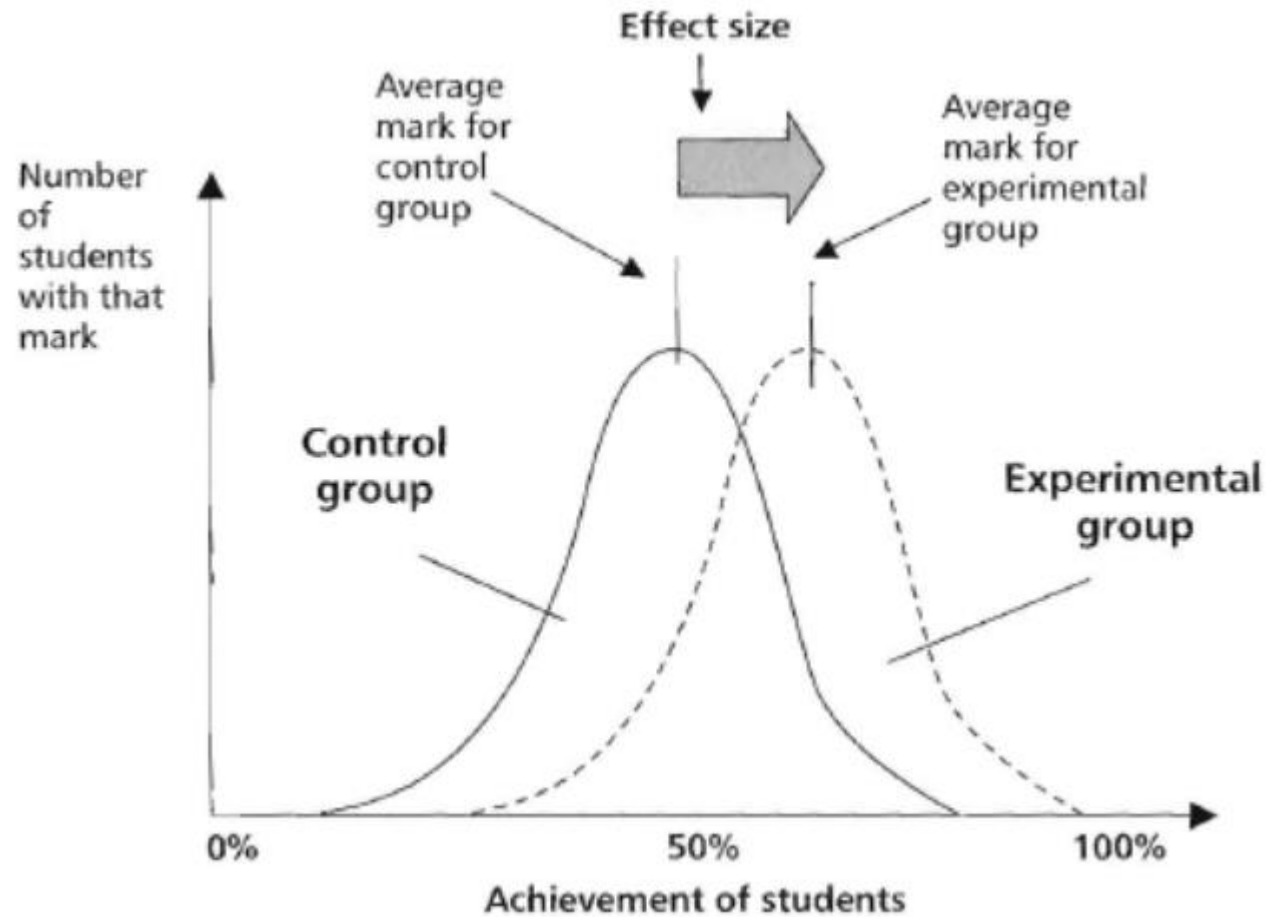


# Quantitative research in education

## The Hattie-study and effect sizes



# Quantitative research in education



$$d = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{(s_1^2 + s_2^2)/2}}$$

Why the stats?

# Quantitative research and stats

Automatisches Speichern

Start Einfügen Seitenlayout

Ausschneiden Kopieren Format übertragen

Calibri F K U

Zwischenablage

	A	B	C	D	E	F	G
1	ID	group	R3000	R5000	P3000	P5000	
2	1	L	18	17	17	15	
3	2	L	18	18	16	15	
4	3	L	18	18	16	13	
5	4	L	18	15	15	14	
6	5	L	18	15	14	10	
7	6	L	17	17	17	11	
8	7	L	11	11	NA	NA	
9	8	L	18	16	9	NA	
10	9	L	18	11	7	6	
11	10	L	18	16	16	9	
12	11	L	17	18	14	NA	
13	12	L	15	16	9	5	
14	13	L	14	9	NA	NA	
15	14	L	18	17	16	11	
16	15	L	17	17	11	11	
17	16	L	17	16	13	12	
18	17	K	17	10	11	5	
19	18	K	15	8	10	6	
20	19	K	15	13	8	4	
21	20	K	16	10	10	5	
22	21	K	13	11	13	5	
23	22	K	12	7	5	2	
24	23	K	12	5	7	4	
25	24	K	13	6	5	1	
26	25	K	18	9	10	8	
27	26	K	17	11	7	3	
28	27	K	18	12	13	6	
29	28	K	15	11	7	3	
30	29	K	16	9	6	2	
31	30	K	17	11	5	4	
32	31	K	16	13	11	6	
33	32	K	12	7	4	3	
34	33	K	16	12	9	6	
35	34	K	15	9	11	10	

Automatisches Speichern Heiglauer\_data\_1.xlsx Suchen Thomas Wagner TW

Start Einfügen Seitenlayout Formeln Daten Überprüfen Ansicht Hilfe

Calibri 11 A A Textbruch Standard

F K U Verbinden und zentrieren

Zwischenablage

Schriftart Ausrichtung Zahl

Bedingte Formatierung Als Tabelle Zellenformatvorlagen Einfügen Löschen Format

AutoSumme Ausfüllen Löschen Sortieren und Filtern Suchen und Auswählen

Ideen Vertraulichkeit

V7 NA

	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	impact_fluency_vocab	fluency_vocab_studies	skills_improved	skills_improved_most_LV	proficiency_decision_studies	taught_CLIL	confident_teaching	confidence_competence	EFL_easier_than_CLIL	more_CLIL	comfortable_teaching	role_of_l2_proficiency_success_CLIL	VST_5000	VST_10000	VST_SUM	
2	to some extent	to some extent	yes	Spoken Academic Production, applied linguistics	yes	yes	somewhat confident	to some extent	yes	yes	very comfortable	plays a big role	80	70	75	
3	yes	to some extent	yes	TLS I+II	yes	no	does not apply to me	yes	not_sure	no	somewhat comfortable	plays a big role	100	100	100	
4	yes	yes	yes	Spoken Interaction	partly	yes	does not apply to me	to some extent	yes	yes	very comfortable	plays a minor role	100	40	70	
5	to some extent	yes	yes	various	partly	yes	very confident	yes	no	yes	very comfortable	plays a minor role	90	60	75	
6	to some extent	to some extent	yes	the speaking classes	partly	no	somewhat confident	to some extent	yes	no	somewhat comfortable	plays a minor role	100	70	85	
7	to some extent	yes	yes	Spoken Academic Production	yes	no	somewhat confident	yes	no	yes	somewhat comfortable	plays a minor role	NA	NA	NA	
8	yes	yes	yes	spoken interaction	partly	no	does not apply to me	yes	no	yes	very comfortable	plays a minor role	100	60	80	
9	yes	to some extent	yes	Written Production 1	no	no	somewhat confident	to some extent	no	yes	somewhat comfortable	plays a minor role	80	80	80	
10	yes	yes	yes	written production 1	no	no	somewhat confident	yes	no	yes	very comfortable	plays a big role	100	30	65	
11	no	to some extent	yes	various	partly	no	does not apply to me	yes	no	yes	very comfortable	plays a big role	80	30	55	
12	yes	to some extent	yes	Pronunciation and Intonation	partly	no	does not apply to me	to some extent	no	yes	very comfortable	plays a minor role	80	60	70	
13	to some extent	yes	to some extent	Spoken Academic Production	yes	no	somewhat confident	yes	yes	no	very comfortable	plays a big role	100	60	80	
14	to some extent	to some extent	to some extent	Listening and speaking	no	no	does not apply to me	to some extent	yes	no	very comfortable	plays a big role	100	70	85	
15	yes	yes	yes	Systemic Linguistics	partly	no	somewhat confident	to some extent	yes	yes	very comfortable	plays a big role	90	40	65	
16	to some extent	yes	yes	TLS, Listening and Speaking	yes	no	does not apply to me	to some extent	yes	no	somewhat comfortable	plays a big role	100	80	90	
17	yes	to some extent	yes	Listening and Speaking	no	no	does not apply to me	to some extent	not_sure	yes	somewhat comfortable	plays a minor role	90	70	80	
18	yes	yes	yes	Linguistics	partly	no	very confident	yes	not_sure	yes	very comfortable	plays a minor role	100	50	75	
19	to some extent	to some extent	yes	various	partly	no	somewhat confident	to some extent	yes	yes	somewhat comfortable	plays a minor role	100	40	70	
20	yes	yes	no	Discourse Linguistics	yes	no	very confident	yes	no	yes	very comfortable	plays a big role	90	90	90	
21	yes	yes	yes	various	partly	no	somewhat confident	yes	yes	no	very comfortable	plays a big role	100	50	75	
22	yes	to some extent	yes	Written Production	no	no	somewhat confident	to some extent	yes	no	very comfortable	plays a big role	80	50	65	
23	no	yes	yes	Spoken Interaction and Speaking and Listening	partly	no	does not apply to me	to some extent	not_sure	no	very comfortable	plays a minor role	100	30	65	
24	to some extent	yes	to some extent	various	yes	no	very confident	yes	yes	no	very comfortable	plays a big role	90	60	75	
25	to some extent	yes	to some extent	Phonetics	yes	yes	very confident	yes	no	no	very comfortable	plays a big role	100	70	85	
26	yes	yes	to some extent	Grammar; linguistics	partly	no	does not apply to me	yes	yes	no	somewhat comfortable	plays a big role	90	50	70	
27	yes	to some extent	yes	Language Work	no	yes	very confident	to some extent	yes	yes	very comfortable	plays a big role	100	50	75	
28	no	yes	no	various	yes	yes	very confident	yes	yes	yes	very comfortable	plays a big role	100	80	90	
29	yes	yes	yes	CLIL	yes	yes	very confident	yes	no	yes	very comfortable	plays a big role	90	60	75	
30	yes	yes	yes	Language Work	partly	yes	very confident	to some extent	no	yes	somewhat comfortable	plays a minor role	100	90	95	
31	to some extent	yes	yes	Textwriting	partly	no	does not apply to me	to some extent	no	no	very comfortable	plays a minor role	100	40	70	
32	yes	to some extent	yes	various	no	no	somewhat confident	yes	yes	yes	somewhat comfortable	plays a big role	90	60	75	
33	yes	yes	yes	Integrated Skills	partly	no	somewhat confident	to some extent	yes	yes	very comfortable	plays a big role	100	70	85	
34	yes	yes	to some extent	Language Work	partly	no	does not apply to me	to some extent	yes	no	very comfortable	plays a big role	90	60	75	
35	yes	yes	to some extent	various	no	yes	somewhat confident	to some extent	yes	yes	somewhat comfortable	plays a big role	100	60	80	
36	yes	yes	yes	various	no	yes	somewhat confident	to some extent	yes	yes	somewhat comfortable	plays a big role	100	20	60	
37	yes	to some extent	yes	Language in Use	partly	yes	very confident	to some extent	no	yes	very comfortable	plays a big role	100	60	80	
38	yes	yes	yes	Economics	yes	no	very confident	yes	no	no	very comfortable	plays a big role	100	70	85	
39	to some extent	to some extent	yes	various	partly	yes	somewhat confident	yes	yes	yes	somewhat comfortable	plays a big role	100	50	75	
40	yes	yes	no	Classroom Management	yes	yes	very confident	yes	no	yes	very comfortable	plays a big role	NA	NA	NA	
41	yes	yes	yes	Phonetics	yes	no	somewhat confident	yes	yes	yes	very comfortable	plays a big role	100	70	85	
42	yes	yes	no	various	yes	yes	very confident	yes	yes	yes	very comfortable	plays a big role	90	60	75	
43	yes	yes	no	Phonetics	yes	yes	very confident	yes	not_sure	yes	very comfortable	plays a big role	90	60	75	
44	to some extent	yes	to some extent	various	yes	no	very confident	yes	no	no	very comfortable	does not play a role at all	100	100	100	

# quantitative research and stats

- **descriptive statistics**

- structure of the data

- sample values, means, dispersion, proportions, ranks, frequencies, tables, visualisations, ....

- **inferential statistics**

- trends in the data

- differences and commonalities

- changes over time

- relationships and dependencies – how does  $x$  change  $y$  when  $z$  is present

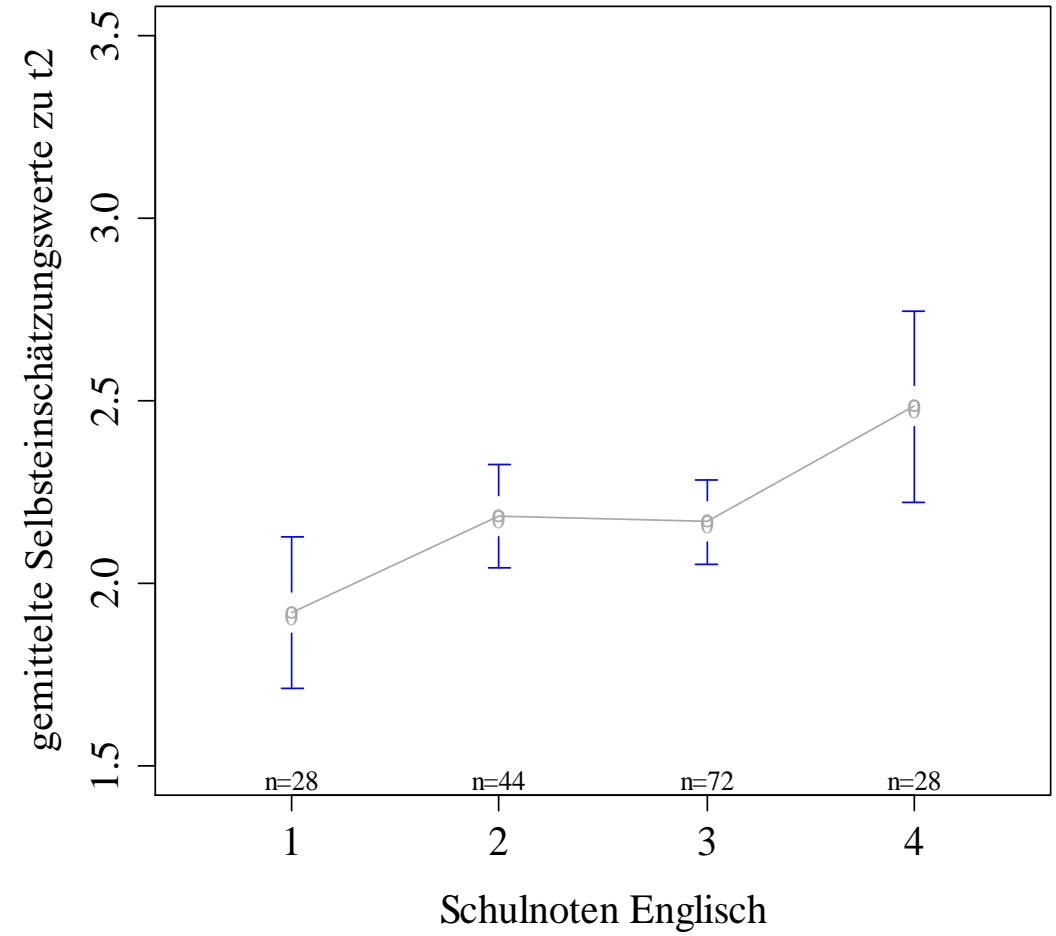
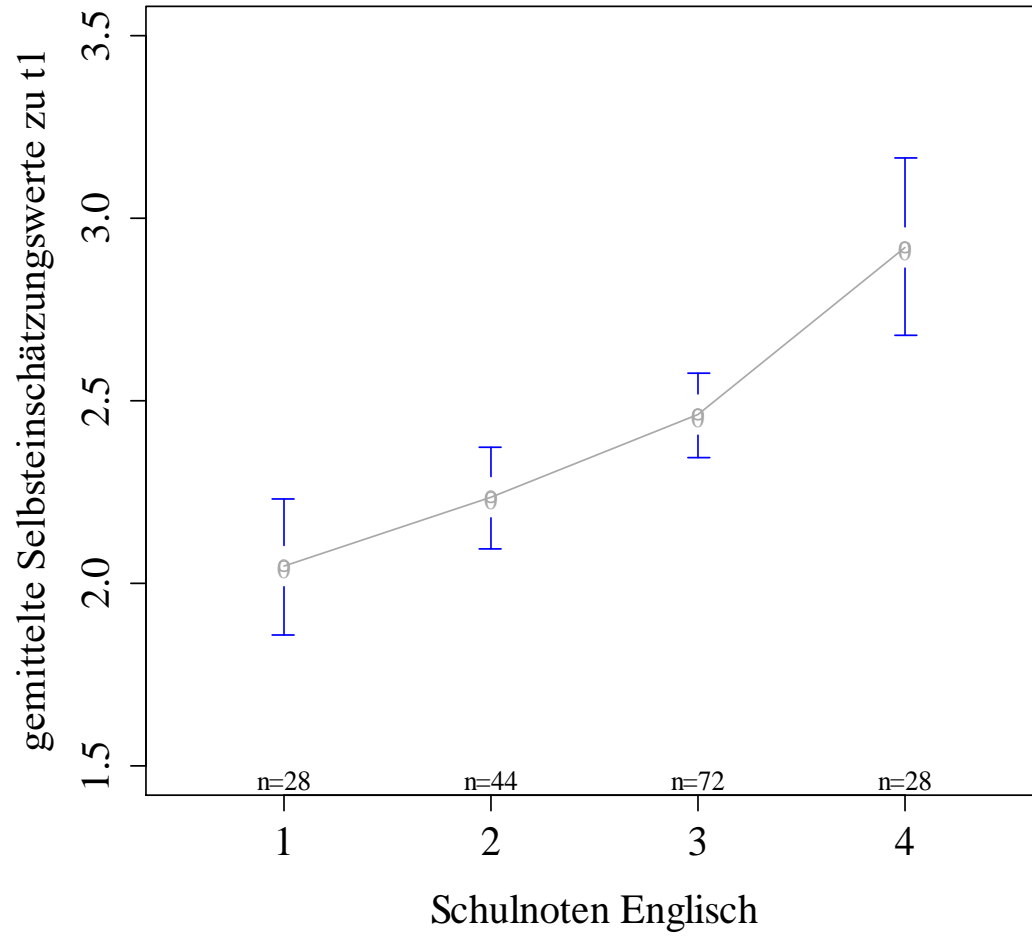
- predictions

# example 1

A one-way repeated measure analysis of variance, comparing the overall group effects across CLIL and control group interacting with time, produced a significant difference for groups ( $F(1, 174) = 4.29, p = .04, \eta_p^2 = .02$ ). Time as a factor, in contrast, is insignificant ( $F(1, 174) = 0.07, p = .79, \eta_p^2 = .0004$ ), as is its interaction with group ( $F(1, 174) = 0.02, p = .89, \eta_p^2 = .0001$ ). Coming back to hypothesis 2, these results suggest that even within the *k1* vocabulary band, the expected vocabulary development does not seem to be co-determined by CLIL exposure.

There is, however, one clearly significant CLIL-based frequency effect. When the *k1* test scores were centred ( $M = 0, SD = 1$ ), a regression model ( $F(3, 85) = 16.91, p < .001$ ) controlling for *t1* showed a significant CLIL effect over time ( $\beta = 0.45, t(85) = 2.31, p = .024$ ).

# example 2



Is this just for techies?



# techie stuff?



0% completed

Dear students,

after more than a month of distance learning and some more weeks ahead of us, we'd like to ask you for some feedback on how your teacher training in English has been.

Please answer the questions referring to courses taught by PHDL, PHOÖ and JKU staff members only.

At this point in time it is very important for us to learn more about your concerns so that we can adjust our planning accordingly.

Thank you for your cooperation!

*The English coordinators Linz*

## 1. Please specify your gender.

- female
- male
- other

## 2. What semester are you in?

- 2nd
- 4th
- 6th
- 8th
- upgrade/ Erweiterungsstudium
- other

## 3. Please specify your second subject.

- |   |   |  |
|---|---|--|
| <input type="radio"/> 1) Bewegung & Sport                             | <input type="radio"/> 10) Gestaltung: Technik. Textil       | <input type="radio"/> 18) Mediengestaltung                                       |
| <input type="radio"/> 2) Bildnerische Erziehung                       | <input type="radio"/> 11) Griechisch                        | <input type="radio"/> 19) Physik   |
| <input type="radio"/> 3) Biologie & Umweltkunde                       | <input type="radio"/> 12) Informatik & Informatikmanagement | <input type="radio"/> 20) Psychologie & Philosophie                              |
| <input type="radio"/> 4) Chemie                                       | <input type="radio"/> 13) Instrumentalmusikerziehung        | <input type="radio"/> 21) Russisch   |
| <input type="radio"/> 5) Deutsch                                      | <input type="radio"/> 14) Italienisch                       | <input type="radio"/> 22) Spanisch   |
| <input type="radio"/> 6) Ernährung & Haushalt                         | <input type="radio"/> 15) Katholische Religion              | <input type="radio"/> 24) Spezialisierung Inklusive Pädagogik/ Fokus Behinderung |
| <input type="radio"/> 7) Französisch                                  | <input type="radio"/> 16) Latein                            | <input type="radio"/> 25) Spezialisierung Schule und Religion                    |
| <input type="radio"/> 8) Geographie & Wirtschaft                      | <input type="radio"/> 17) Mathematik                        | <input type="radio"/> 26) Other  |
| <input type="radio"/> 9) Geschichte & Sozialkunde/ Politische Bildung |   |  |

Next

# techie stuff?

Microsoft Excel interface showing data analysis for word-class associations between L1 and L2.

**Excel Ribbon:** Datei, Start, Einfügen, Seitenlayout, Formeln, Daten, Überprüfen, Ansicht, Hilfe. Sub-ribbons include Font (Schriftart), Alignment (Ausrichtung), Numbers (Zahl), and Styles (Formatvorlagen).

**Worksheet Data (Columns A-Q):**

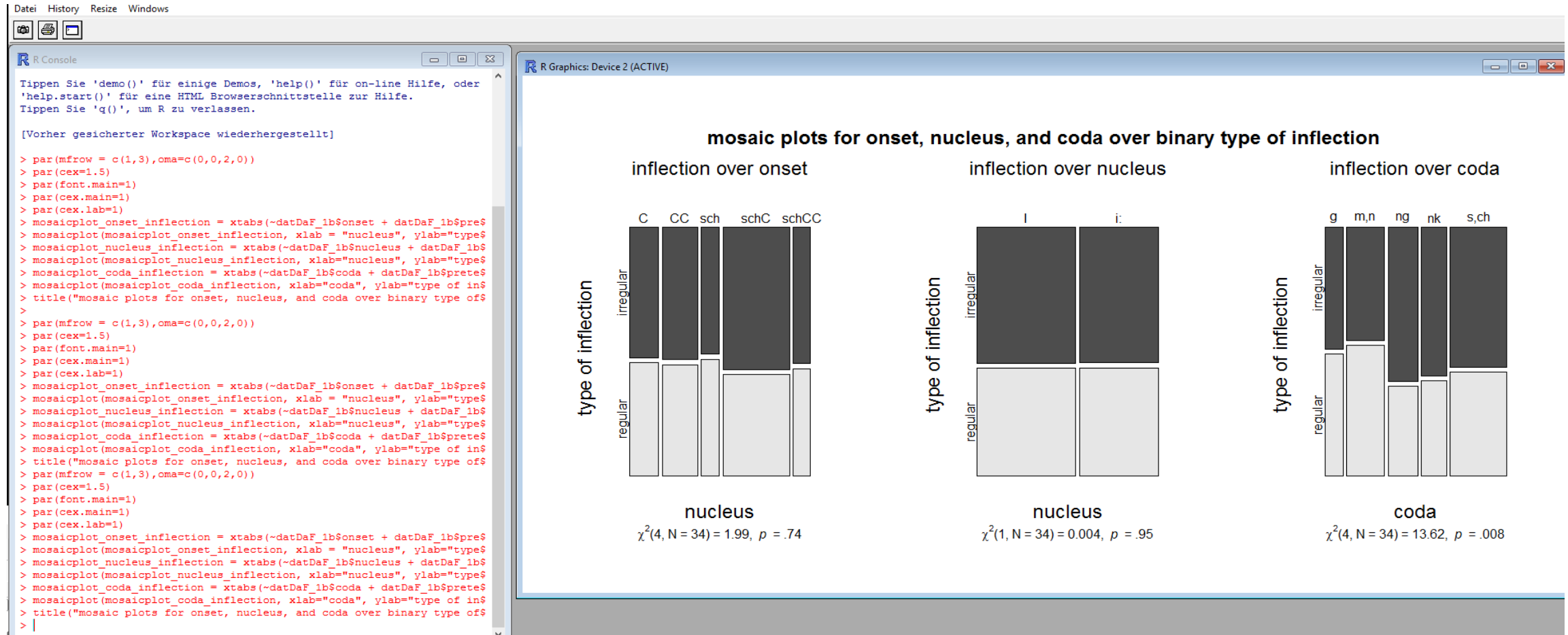
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	noun L1	noun L2	verb L1	verb L2	adjective	adjective L2				noun L1	noun L2	verb L1	verb L2	adjective	adjective L2		
1																	
2																	
3	paradigmatic	42	28	37	17	47	31			paradigmati	134	98	42	23	37	90	
4	paradigmatic L2	6	3	3	3	37	33			syntagmati	146	158	229	228	175	165	
5	paradigmatic L3	21	18	1	1	8	8			phonologic	0	4	0	2	1	0	
6	paradigmatic L4	32	19	0	0	2	0			other	20	40	29	47	27	45	
7	paradigmatic 2	33	30	1	2	3	18			sum	300	300	300	300	300	300	
8																	
9	syntagmatic 1	36	57	158	194	132	100										
10	syntagmatic 2.1	78	59	20	13	15	10										
11	syntagmatic 2.1	25	37	9	8	13	49										
12	syntagmatic 2.2	4	2	4	1	0	0										
13	syntagmatic 2.3	3	3	38	12	15	6										
14																	
15	phonological	0	4	0	2	1	0			paradigmati	45	33	14	8	32	30	
16										syntagmati	49	53	76	76	58	55	
17	other 1	13	14	11	19	10	25			phonologic	0	1	0	1	0	0	
18	other 2	6	16	12	5	13	5			other	7	13	10	16	9	15	
19	other 3	1	9	6	15	4	12			per cent	100	100	100	100	100	100	
20	other 4	0	0	0	0	0	0										
21	other 5	0	0	0	4	0	0										
22	other 6	0	1	0	3	0	1										
23	other 7	0	0	0	1	0	2										
24																	
25	sum	300	300	300	300	300	300										
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**Barplots:**

- Barplot for L1 and L2 word-association responses per word class in categories:** Compares response percentages for nouns, verbs, and adjectives across L1 and L2 for four categories: paradigmatic, syntagmatic, phonological, and other.
- Barplot for response categories for nouns in the L1 and L2:** Focuses on noun responses.
- Barplot for response categories for verbs in the L1 and L2:** Focuses on verb responses.
- Barplot for response categories for adjectives in the L1 and L2:** Focuses on adjective responses.

**Navigation:** original data | noun | verb | adjective | total L1&L2 | total 2 L1&L2 | **total 3 word class** | + | 4

# techie stuff?



# techie stuff?

Running head: [SHORTENED TITLE UP TO 50 CHARACTERS]

1

[Title Here, up to 12 Words, on One to Two Lines]

[Author Name(s), First M. Last, Omit Titles and Degrees]

[Institutional Affiliation(s)]

Author Note

[Include any grant/funding information and a complete correspondence address.]

[SHORTENED TITLE UP TO 50 CHARACTERS]

2

Abstract

[The abstract should be one paragraph of between 150 and 250 words. It is not indented. Section titles, such as the word *Abstract* above, are not considered headings so they don't use bold heading format. Instead, use the Section Title style. This style automatically starts your section on a new page, so you don't have to add page breaks. Note that all of the styles for this template are available on the Home tab of the ribbon, in the Styles gallery.]

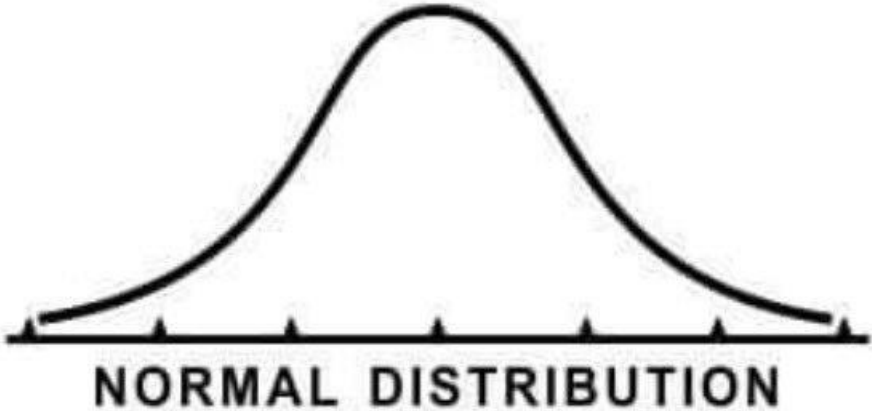
*Keywords:* [Click here to add keywords.]

# techie stuff?

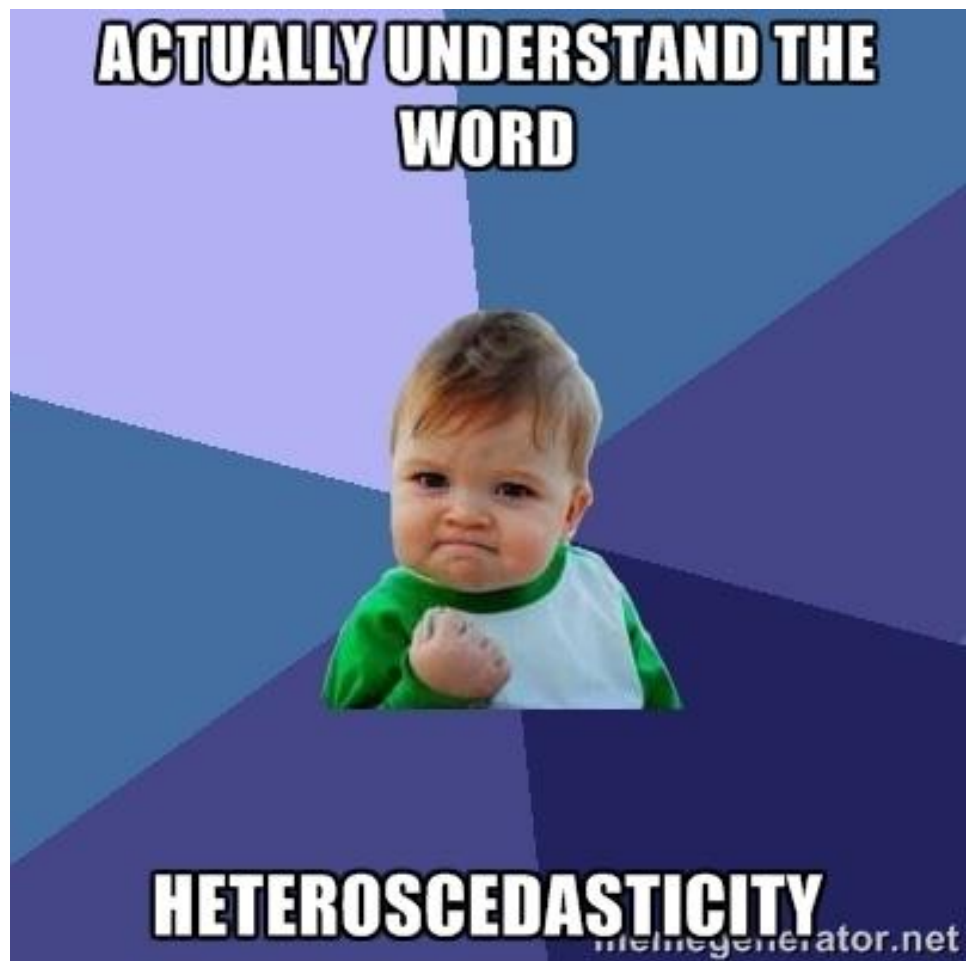
- Useful links:
- <https://researchbasics.education.uconn.edu/>

Stats can be funny and disturbing

funny stats

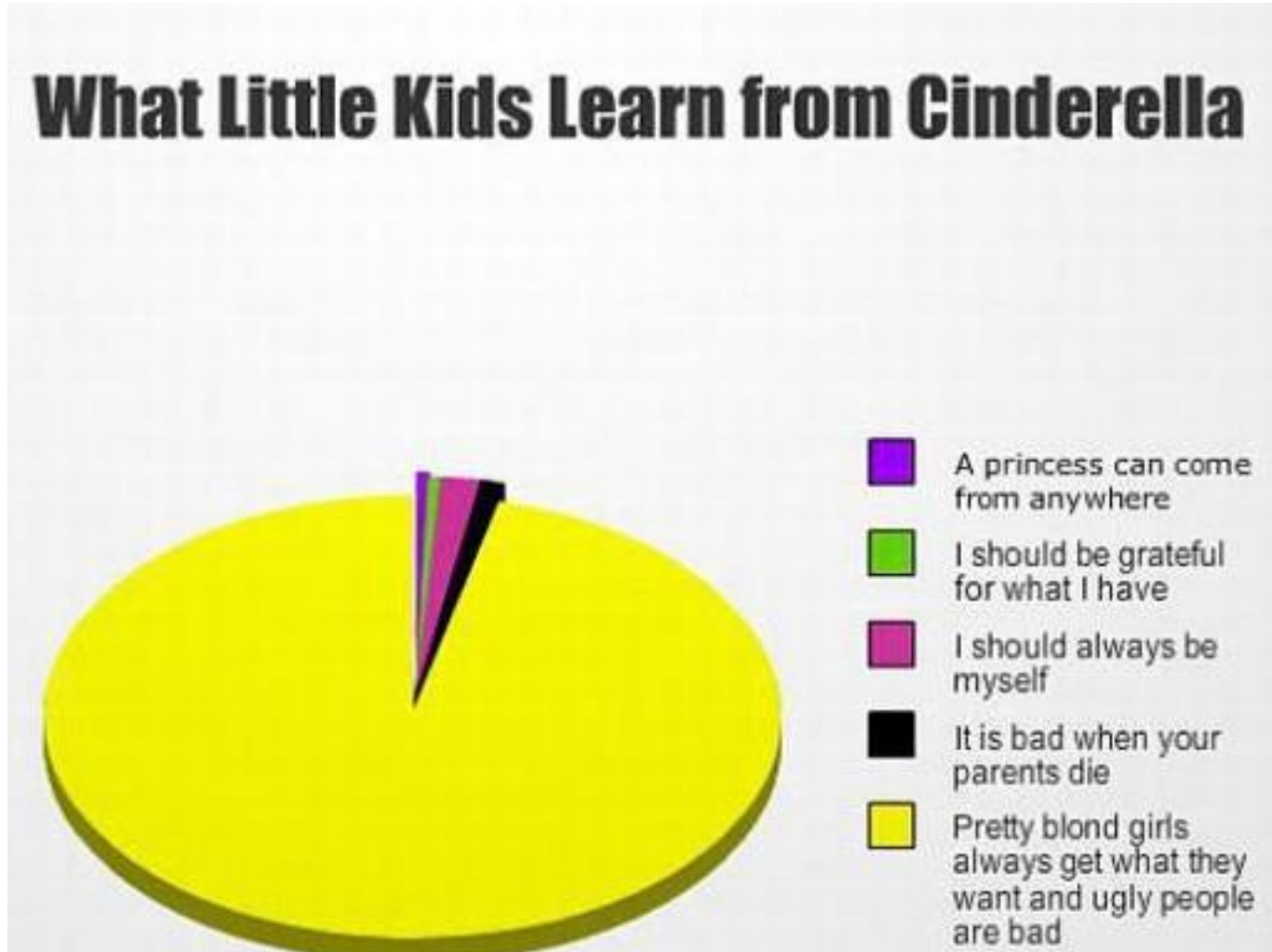


funny stats



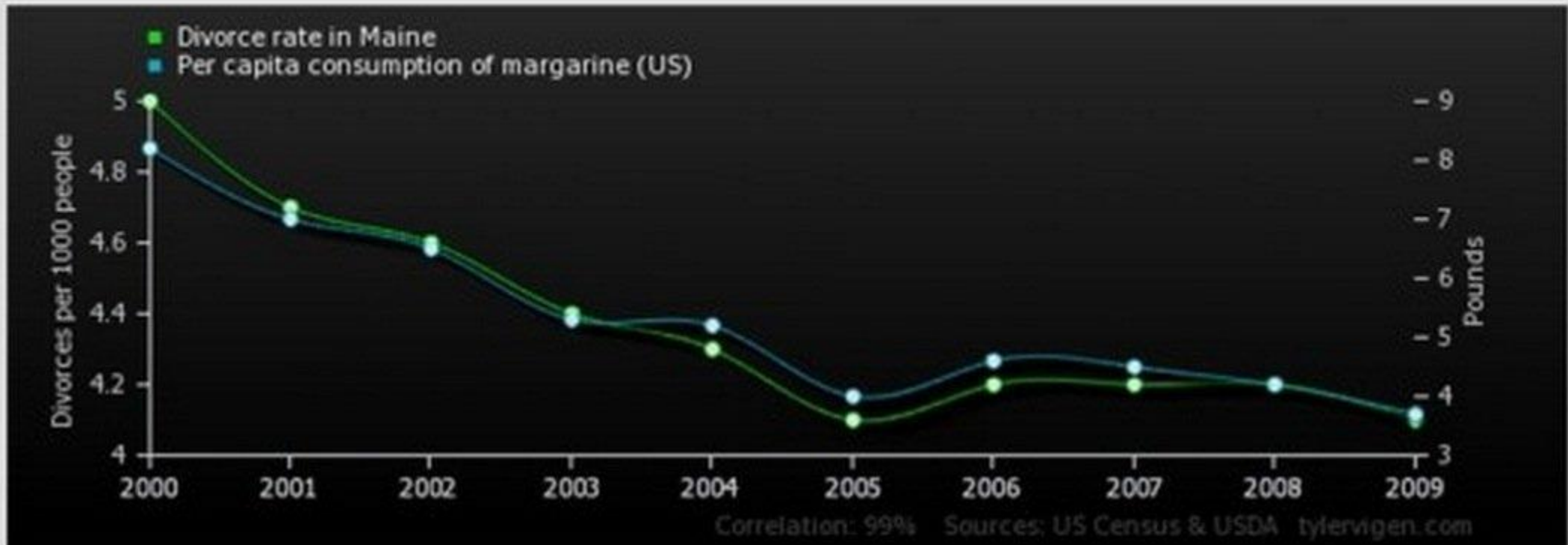


funny stats

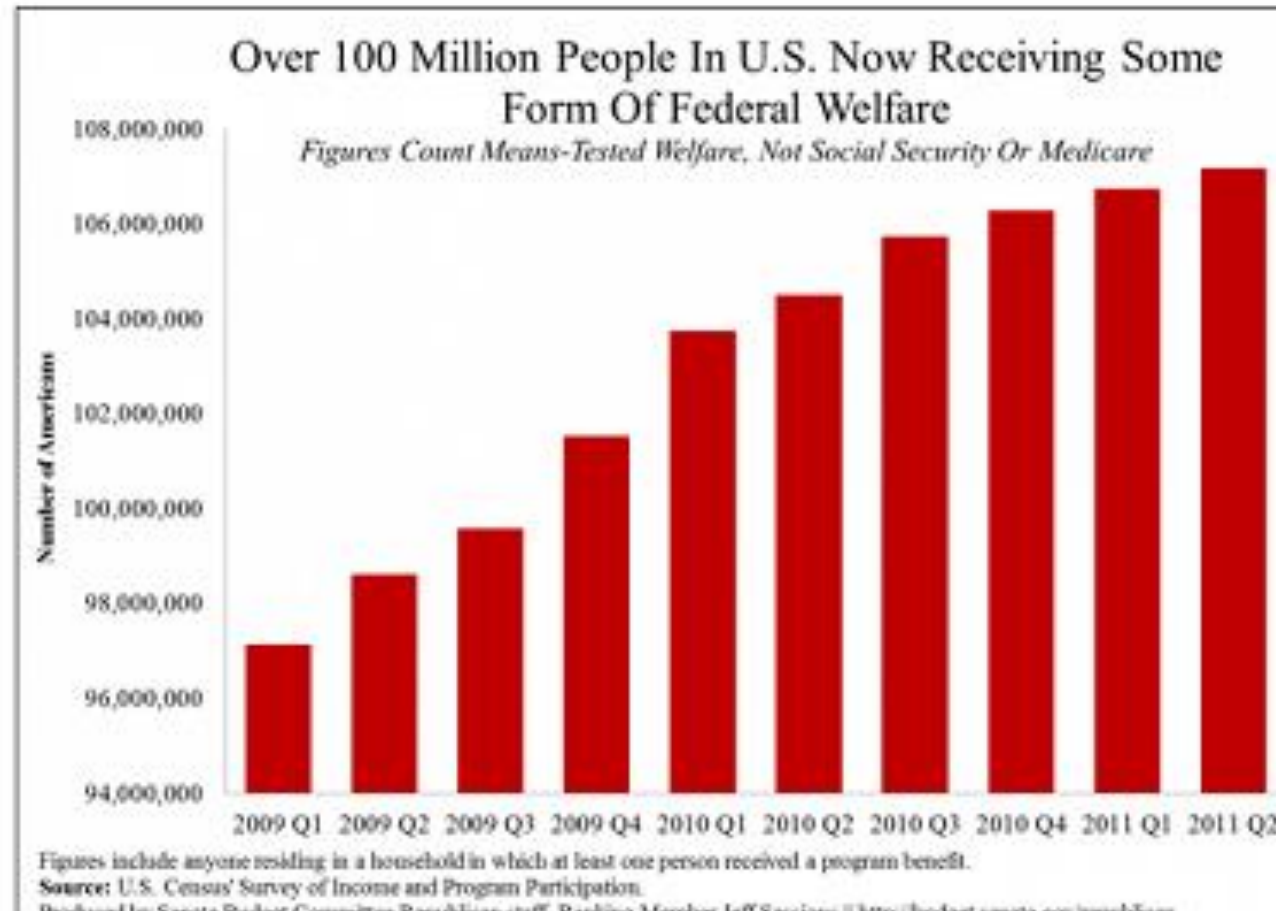


funny stats

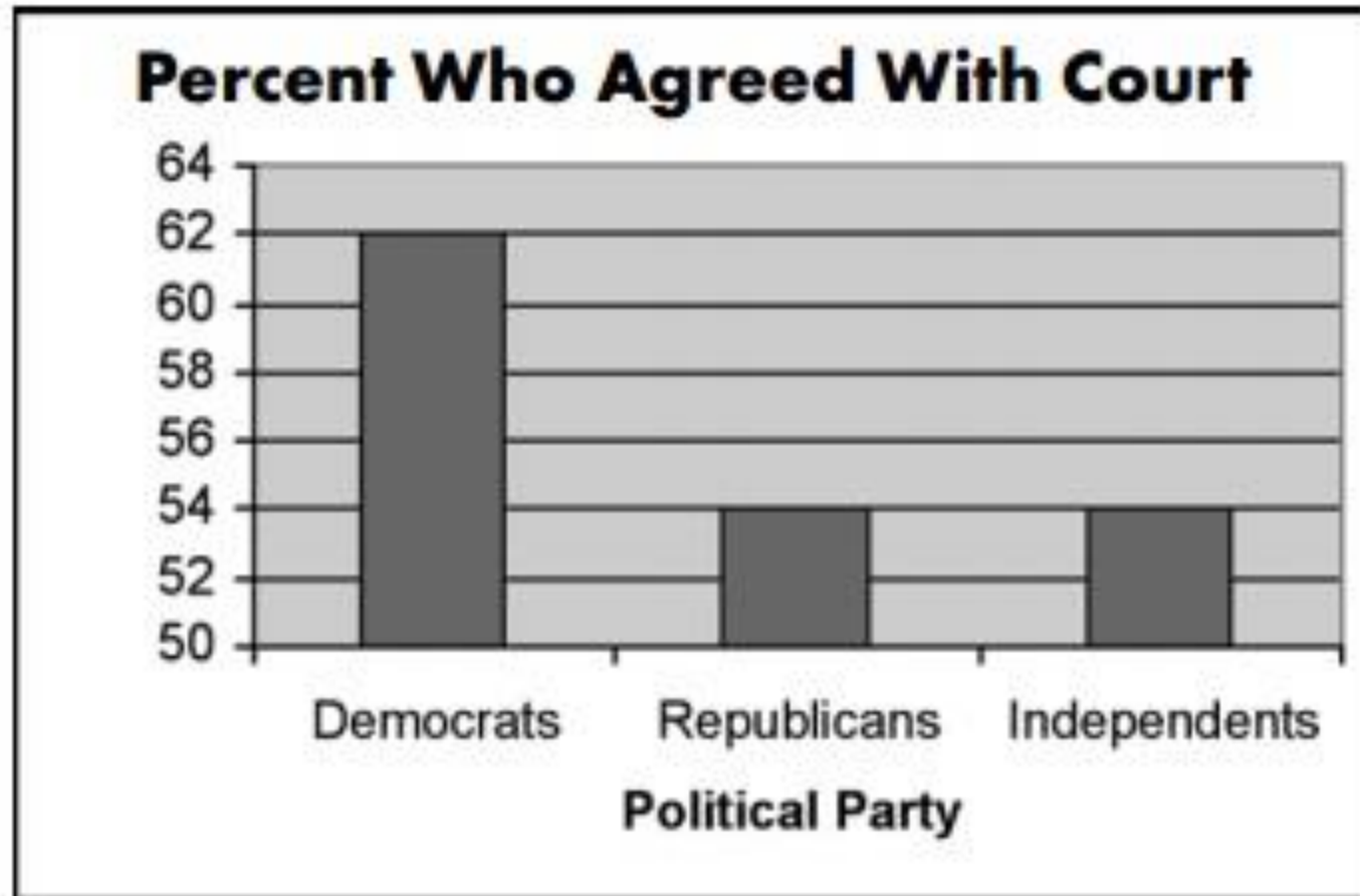
## Divorce rate in Maine correlates with Per capita consumption of margarine (US)



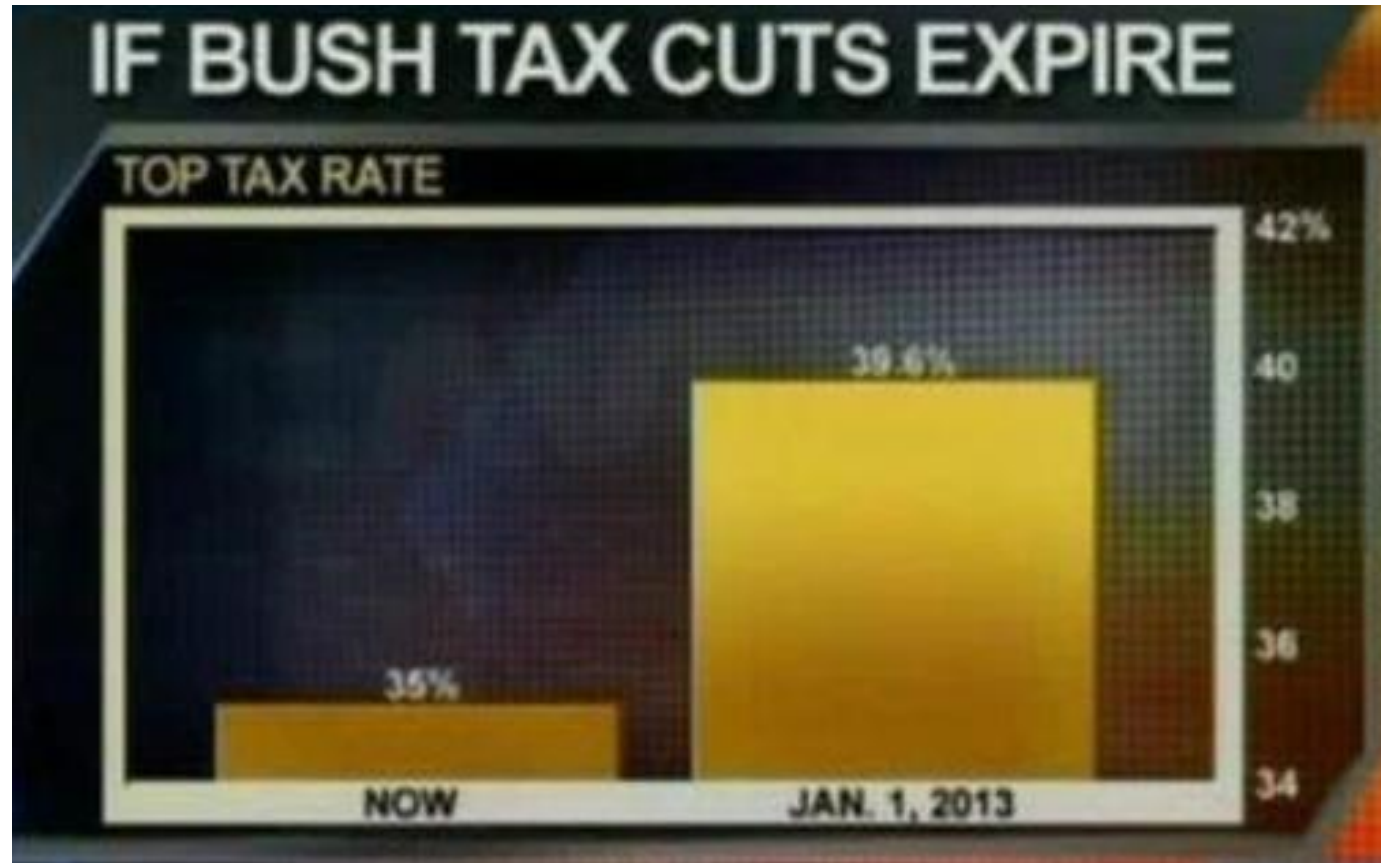
# disturbing stats



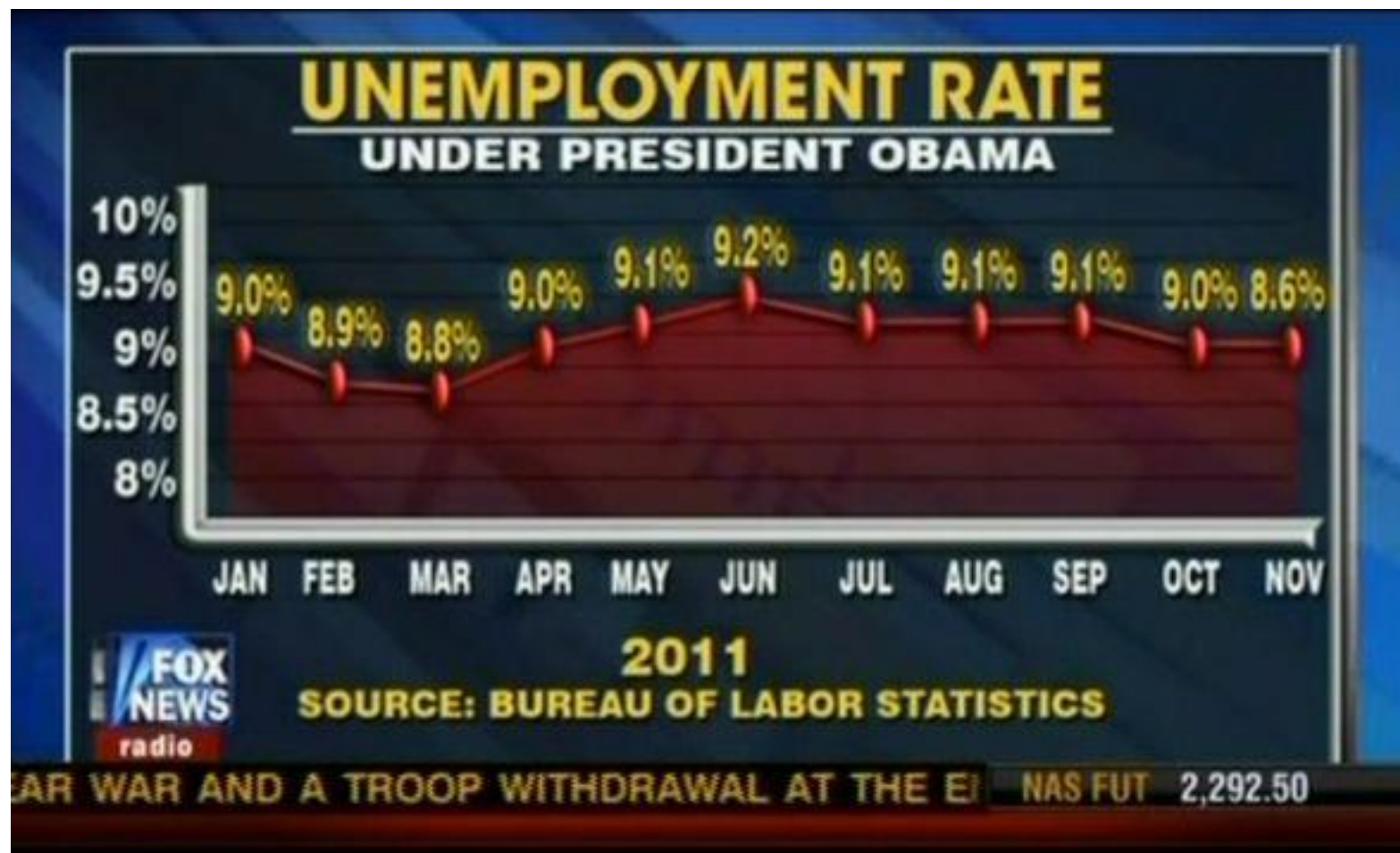
disturbing stats



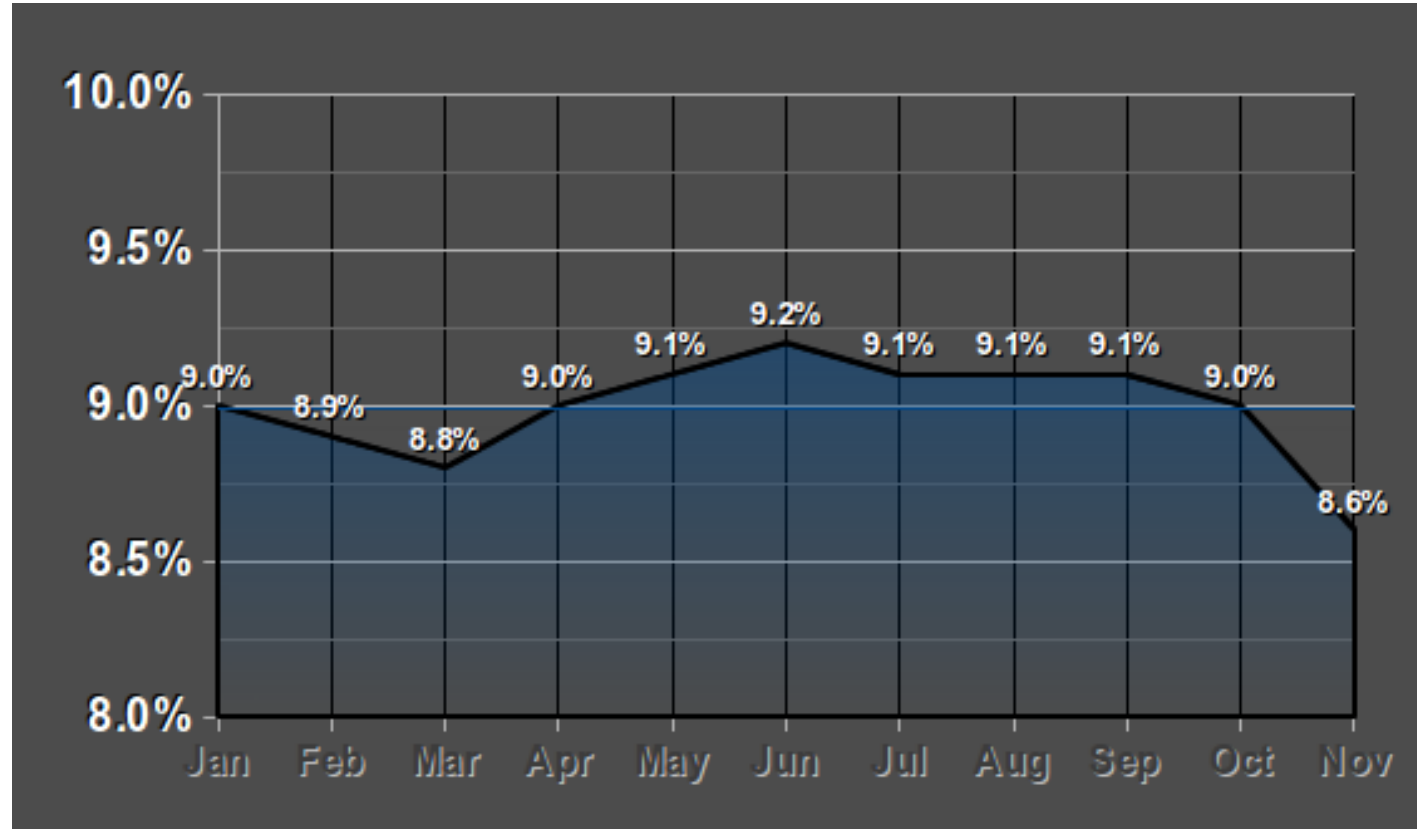
disturbing stats



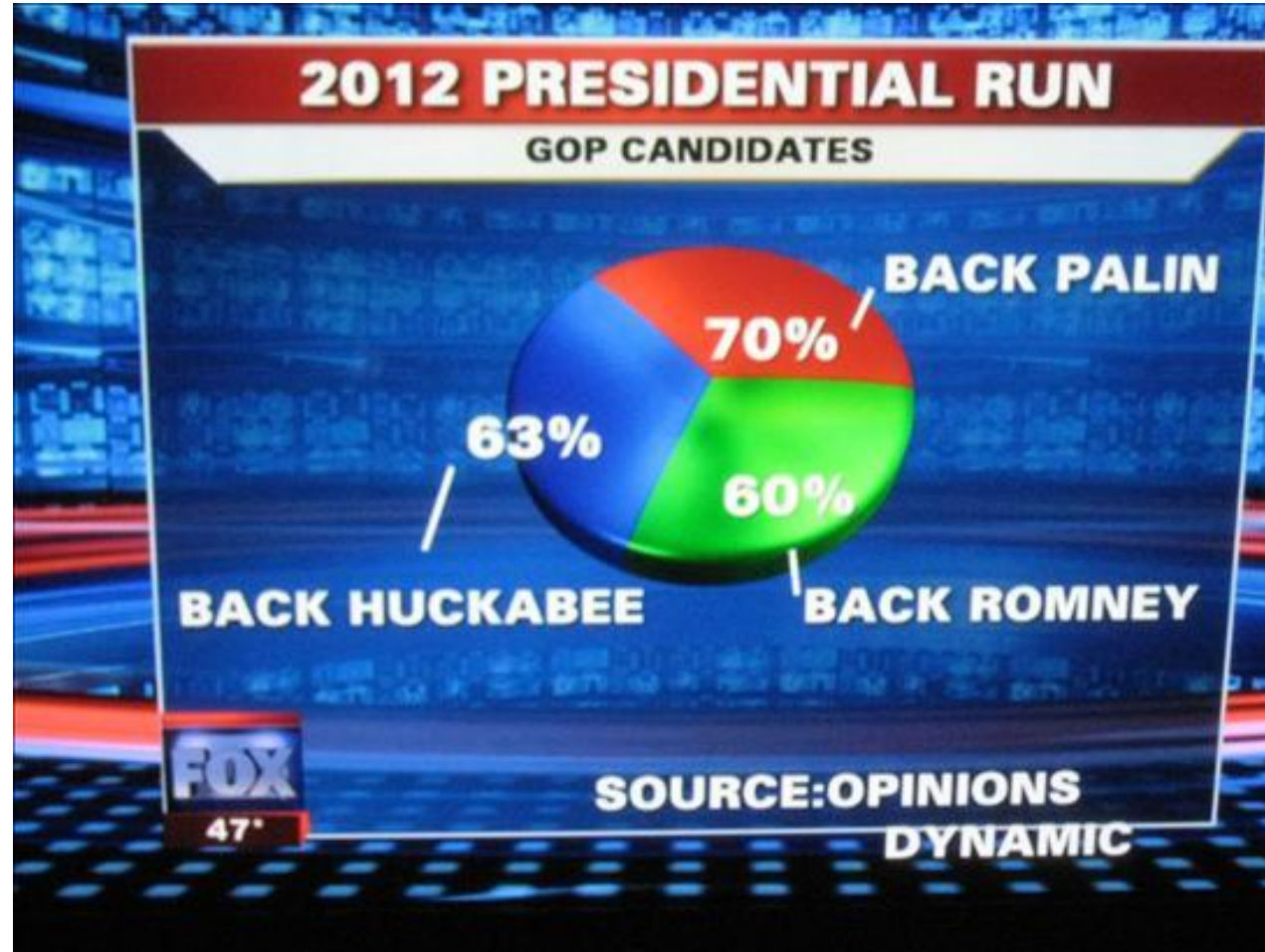
disturbing stats



# disturbing stats



disturbing stats





disturbing stats

