The Meaning of Confidence when Receiving Advice

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Caveat

An experiment->not theory

Judge-advisor paradigm-> private, not public agregation of opinion

Perceptive stimuli

Analysis still in progress

Stata figures

Late frost?

Consulting colleagues or statistical aids might be an easy way to improve accuracy

Do we process advice efficiently?

Suboptimal use of advice (Meehl, 1954)

Egocentric bias (Yaniv & Kelinberger, 2000)

Reducing judge confidence increase advice use (Sieck & Arkes, 2005)

Confidence as a weight to aggregate opinions

Judges prefer highly confident Advisors (Price & Stone, 2004)

Conflict cases in dyads resulted in following the judgment of the higher confidence (Koriat, 2015)

***«Literal Confidence» Hypothesis**:*

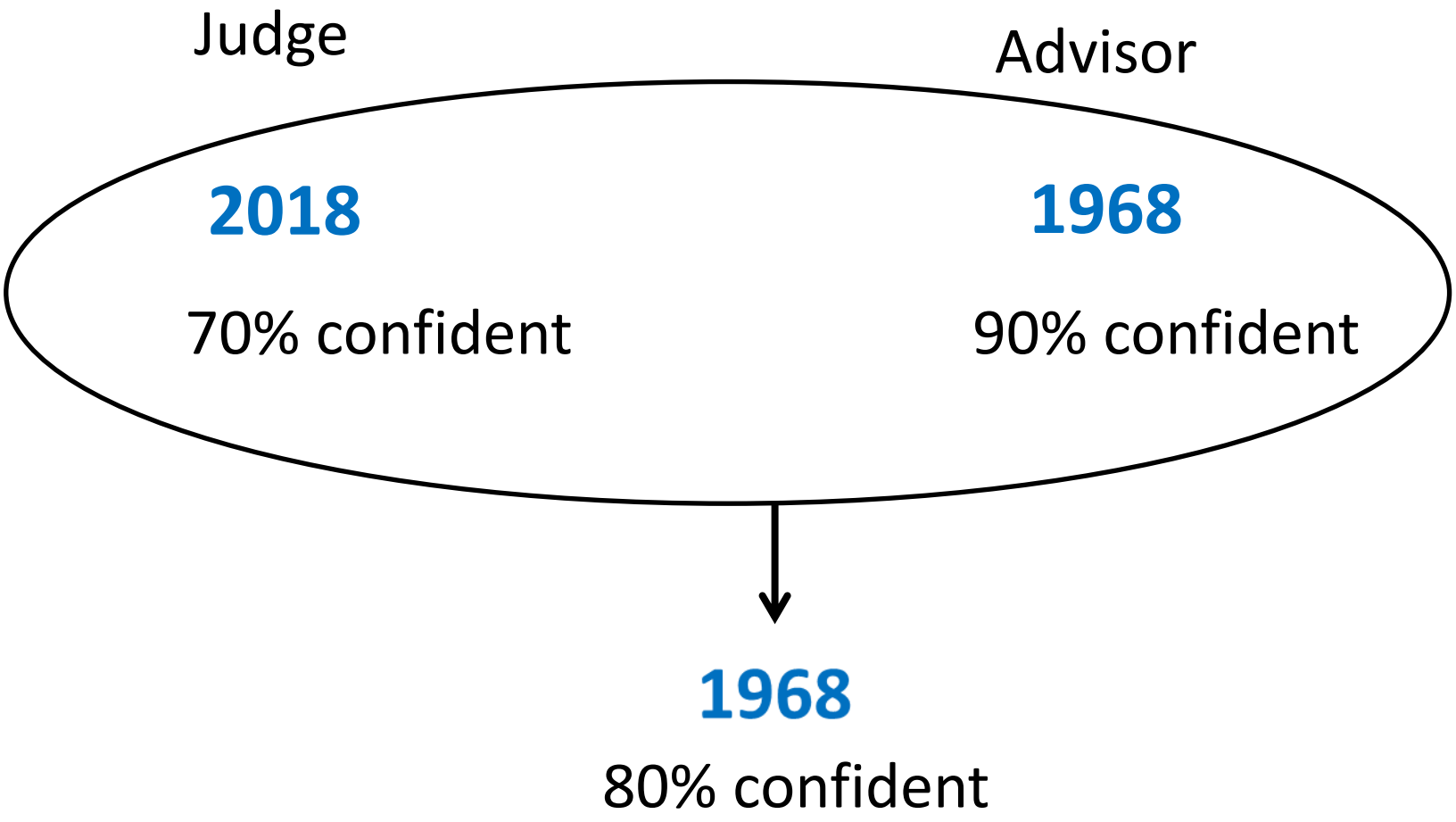
Confidence is used as a proxy for accuracy, for both the sender and receiver of the advice

Judge final beliefs =

Judge initial beliefs + advisor beliefs

(Bayes in log odds assuming independence)

Which day was the colder in Paris?
November 29th 1968 or 2018



Judge-Advisor paradigm: a trial

«Literal Confidence» prediction:

Overconfidence -> under use of advice

A case of conflict

Perfect calibration: judge 60% sure (and 60% accurate), advisor 70% sure (and 70% accurate) -> advice taking and 60% sure

Overconfident judge: judge 80% -> no advice taking and 60 % sure
20% loss in accuracy compared to advice taking

Advisor also overconfident: 90% sure -> advice taking and 70% sure

Similar level of overconfidence between judge and advisor may improve advice taking

But…

Judge

Advisor

2018

70% confident

1968

90% confident

~~**1968**~~

~~80% confident~~

But…

Judge

Advisor

2018

70% confident

1968

90% confident

2018

70 % confident

Egocentric bias independent of overconfidence?

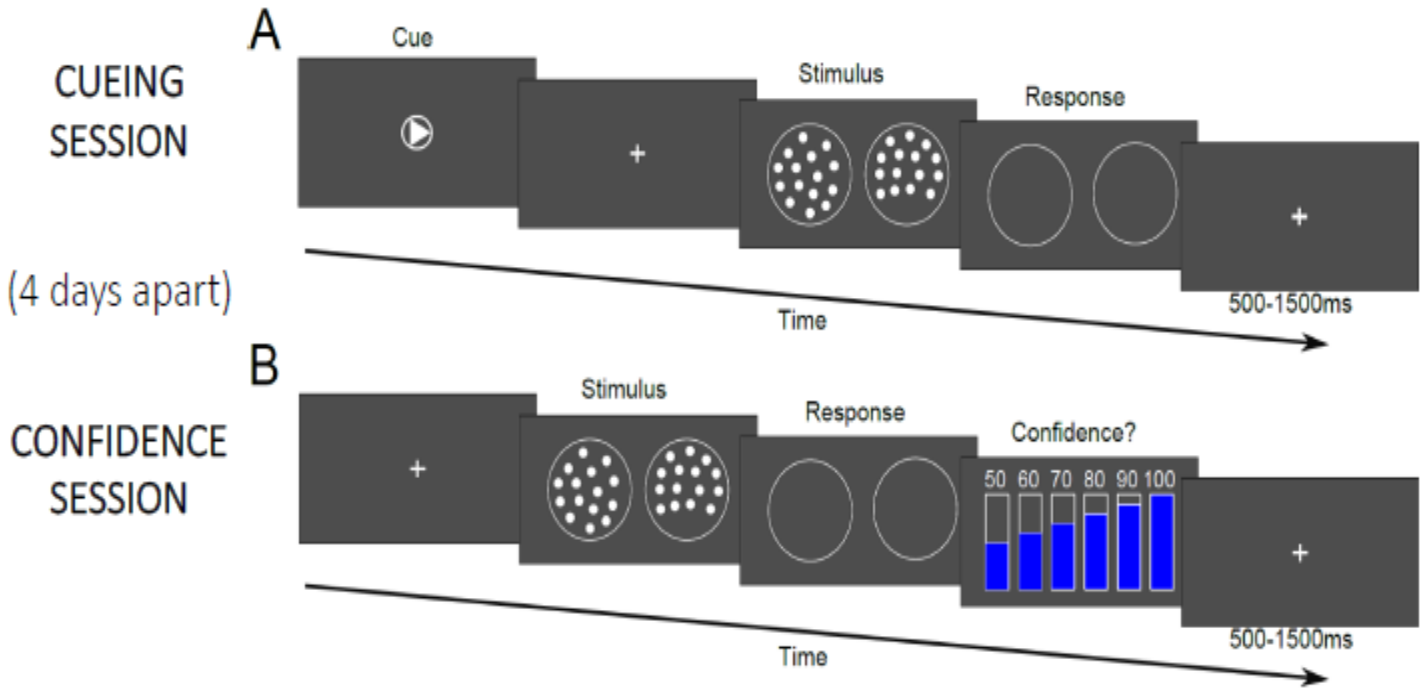
Judge final beliefs =

judge initial beliefs + w(advisor beliefs)

Self perception (overconfidence) and others' perception (egocentric bias) may be correlated

Some preliminary evidence: no support for the *literal confidence hypothesis* in a cueing task

Cueing experiment

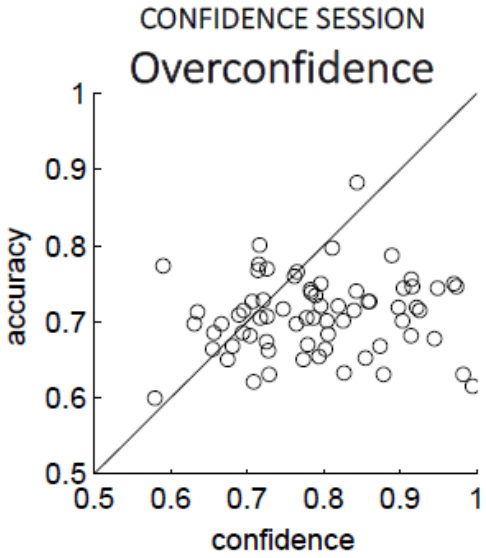


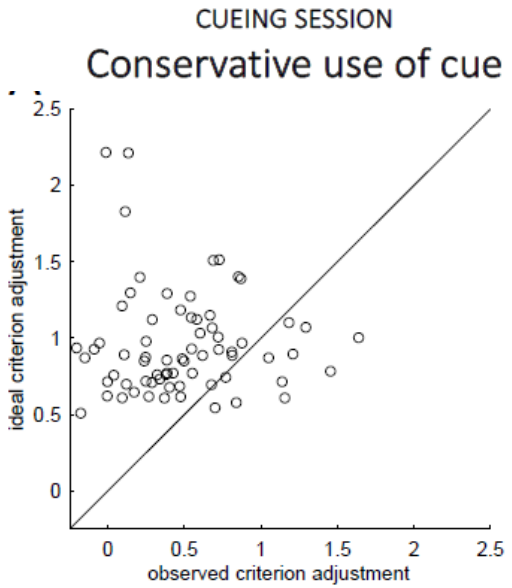
A) **Cueing session. Cue condition:** 2 predictive cues indicating with 75% validity the nature of the forthcoming stimulus (triangle pointing to the left, triangle pointing to the right). **No cue condition:** 1 neutral cue (diamond). 512 trials. Payoff: response accuracy 0.02 euros/trial.

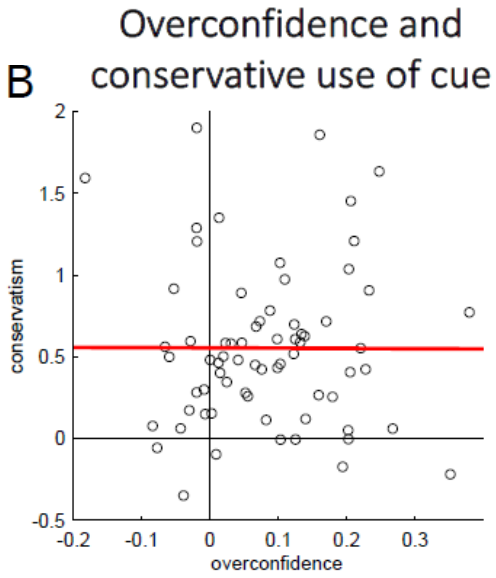
B) **Confidence session.** Confidence ratings from 50% to 100%. 512 trials. Payoff: confidence accuracy (probability matching rule) 0.02 euros/trial.

Hainguerlot et al, in prep

Main findings







Also…

Learning advisor confidence bias may alter advice use: overconfidence are backfired (Sah et al., 2013)

Overconfidence drived by optimistic reinforcement learning (Lefebvre et al, 2017)

The two, overconfidence and asymetric reinforcement learning on advisor may be related

Some advisors are wise!

Judge

Advisor

2018

70% confident

1968

90% confident

1968

90 % confident

Objective

Test the «Literal Confidence» predictions

- Overconfidence -> under use of advice
- Overconfidence fit improve advice taking

Correlation between overconfidence, egocentric bias and reinforcement learning

Overconfidence measures

Mean overconfidence

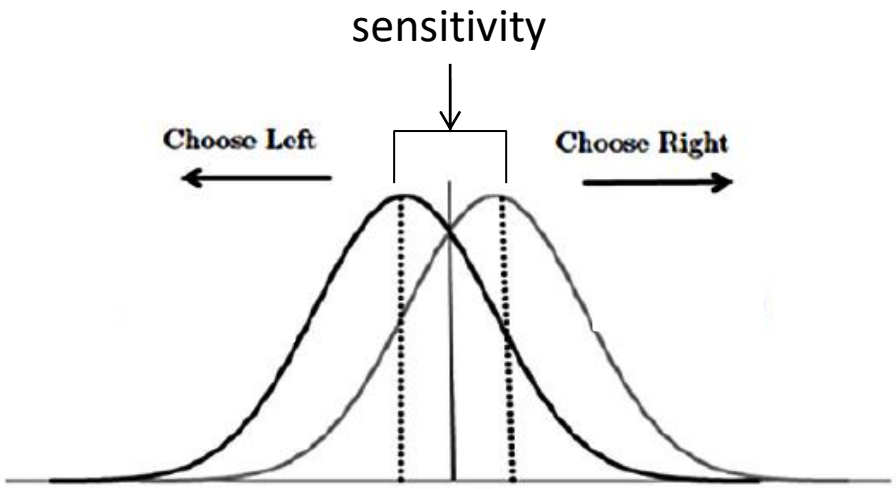
Mean confidence – mean Accuracy

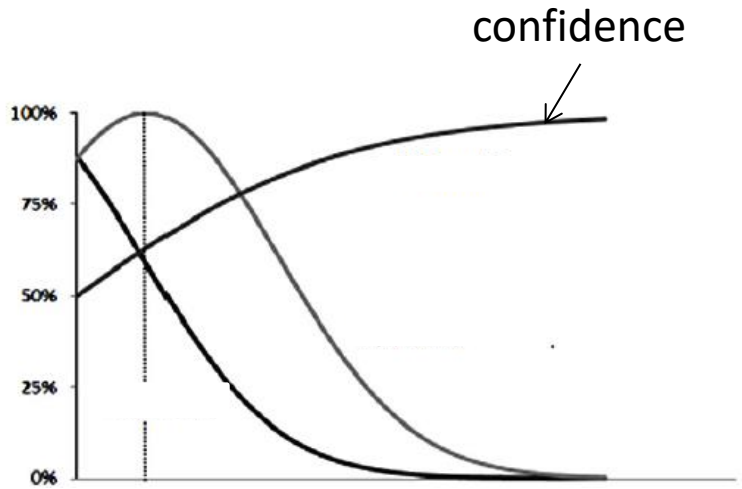
An empiric law: probability distortion in log odds

Subj. prob = elevation + slope*obj. prob.

Zhang & Maloney, 2012

Signal detection theory





Probability of internal signal

Bayesian observer: ***Confidence = internal signal*sensitivity***

Overconfident observer: ***Confidence = elevation + internal signal*slope*sensitivity***

Judge (real people) and advisor (automata)

Judge accuracy : 70%

Advisors differing only in reported confidence

	Low Confidence	Medium Confidence	High Confidence
Real Characteristics	62.5	75	87.5
Advisor 1 mean over. = 10% slope = 2.04 elevation = -.16	70	85	100
Advisor 2 mean over. = 0% slope = 1.83 elevation = -.87	50	75	100

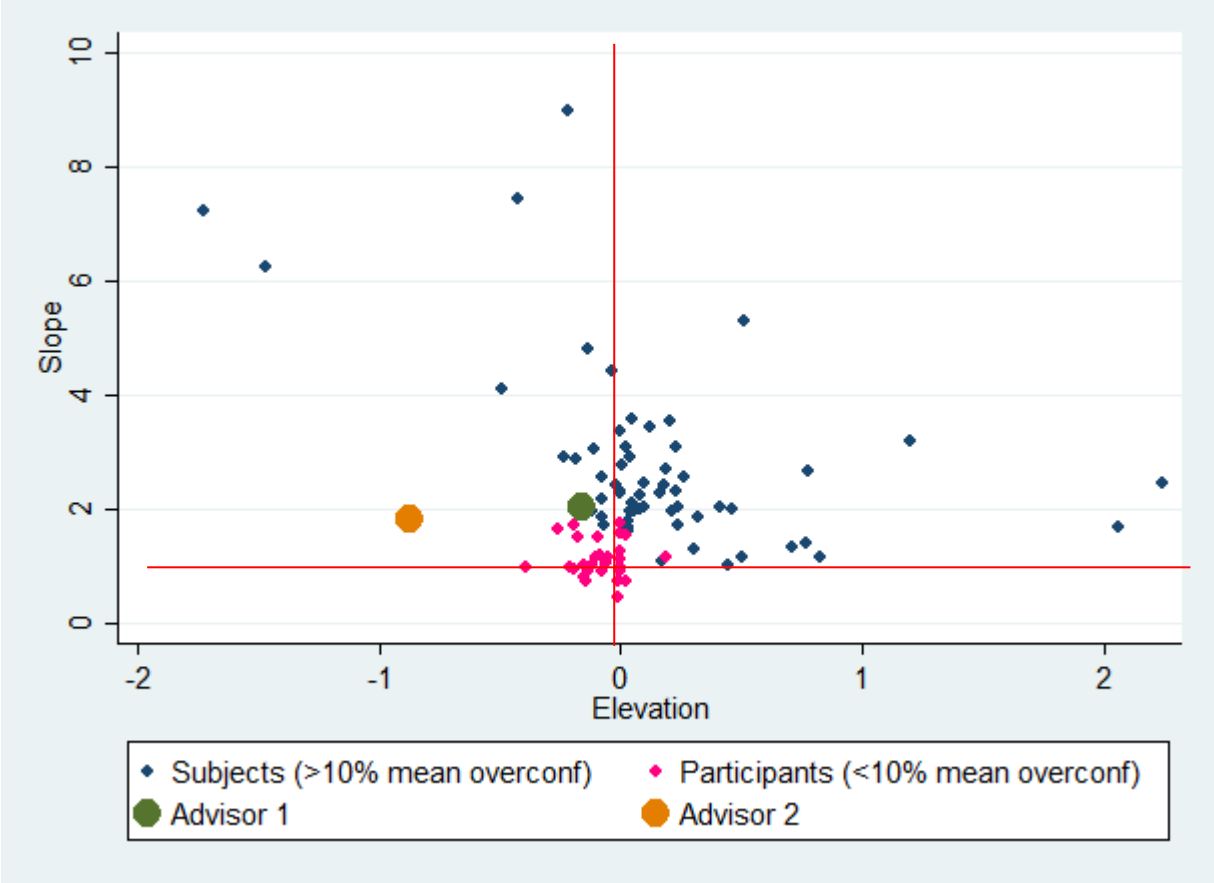
Accuracy and overconfidence fit: simulation

	Well calibrated advisor	Advisor 1 slope = 2.04 elevation = -.16	Advisor 2 slope = 1.83 elevation = -.87
Well calibrated judge	**79.72 %**	78.66 %	78.91 %
Judge Slope = 2.04 elevation = -.16	78.54 %	**79.61 %**	78.74 %
Judge slope = 1.83 elevation = -.87	79.41 %	78.88 %	**79.59 %**

Subjects' overconfidence

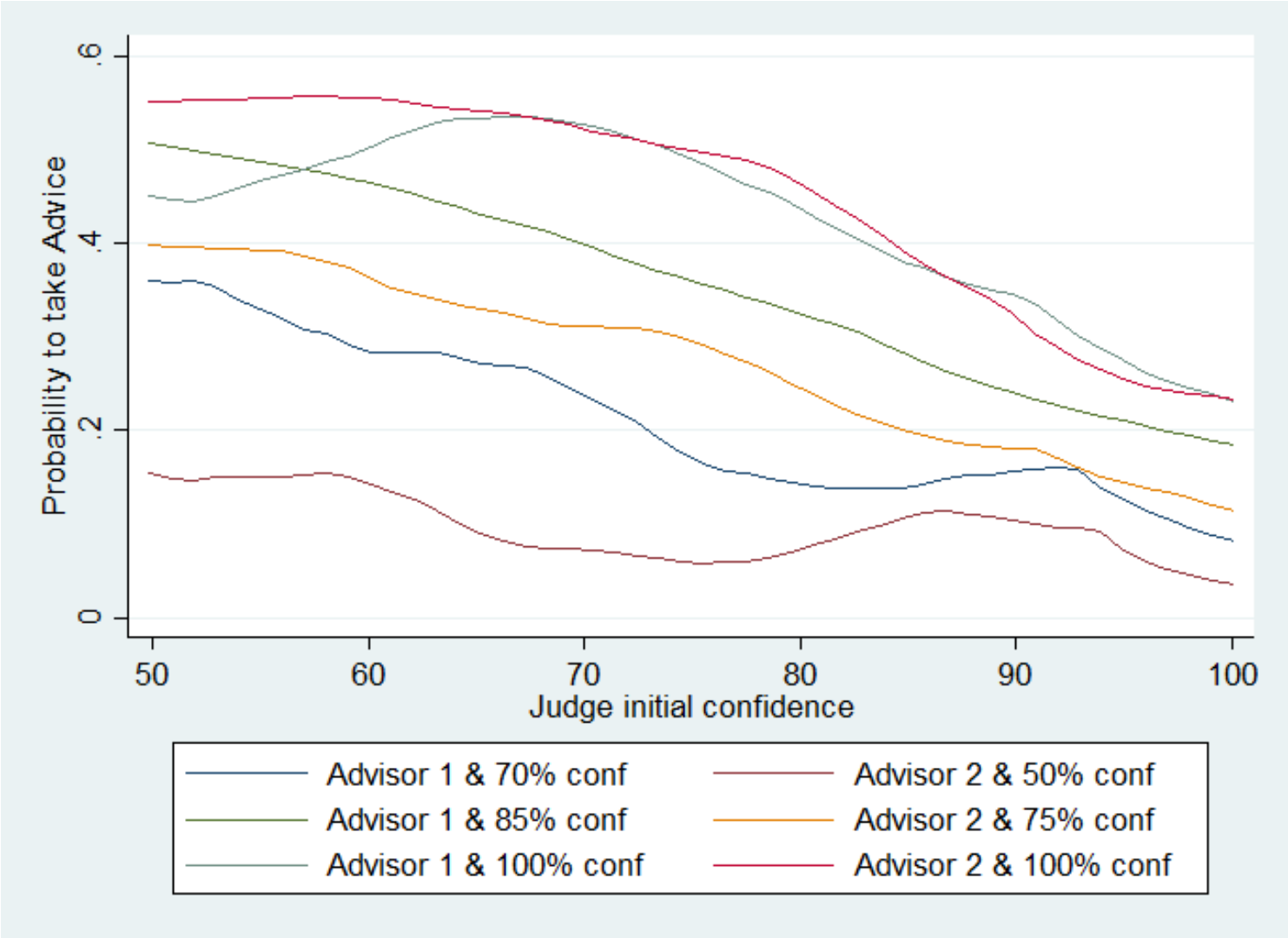
Mean overconfidence : M = 12.7 SD = 10.2
Slope: M = 2.16 SD = 1.49
Elevation: M = .07 SD = .47

elevation = 0



slope = 1

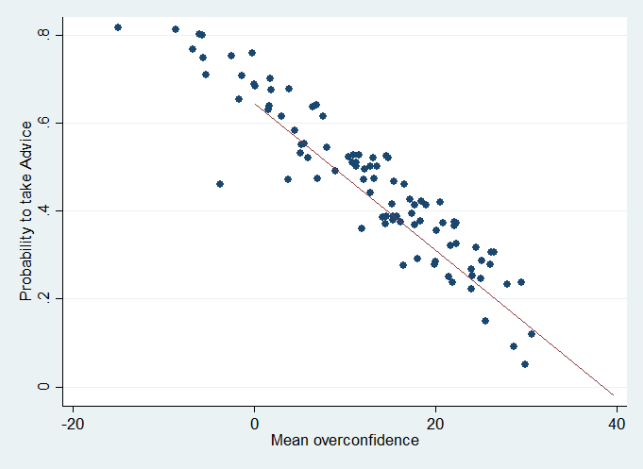
Confidence as a weight to aggregate opinions?



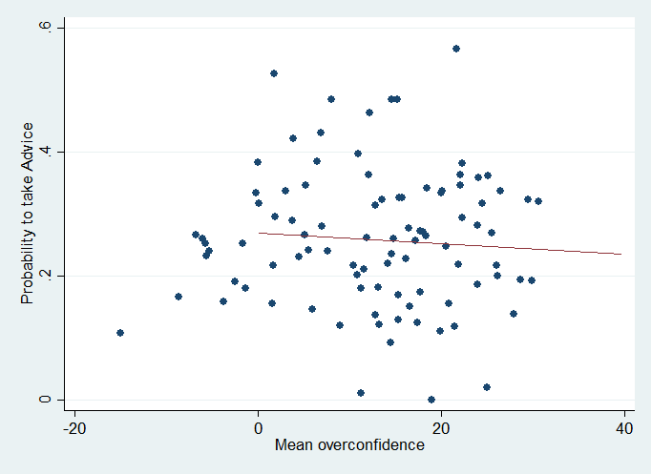
Overconfidence and under use of advice?

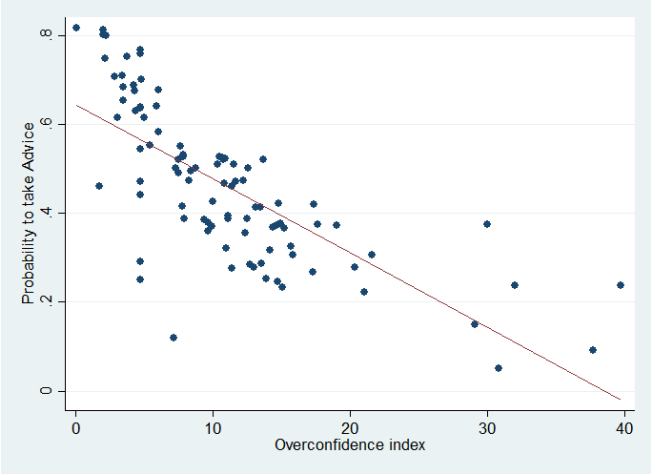
Subject choice and confidence + LCH -> prediction on advice taking

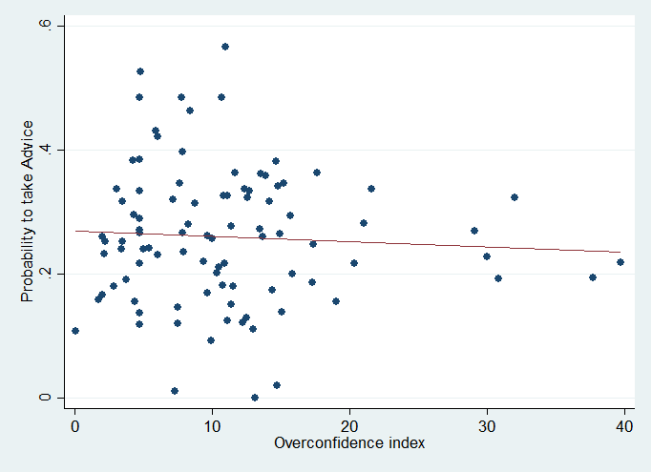
Predicted



Observed

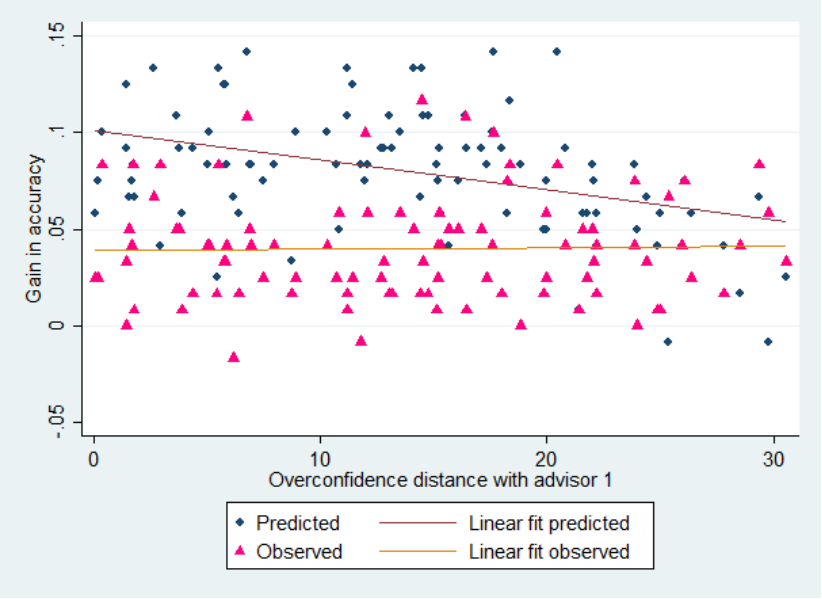




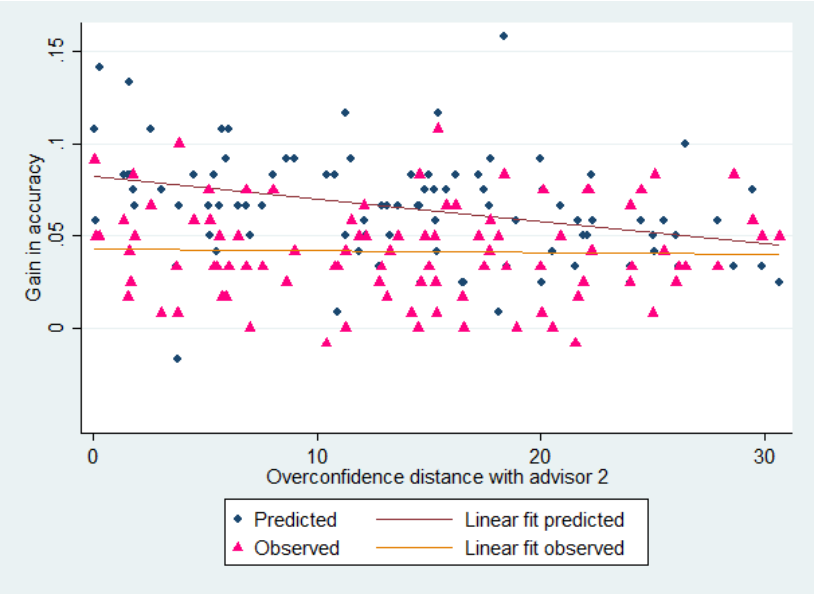


Overconfidence fit and accuracy

Advisor 1



Advisor 2



Next

Estimate a model of asymmetric learning

Judge final beliefs$_t$ =

judge initial beliefs$_t$ + w_t (advisor beliefs)

w_{t+1} =w_t + λ*(advisor accuracy - w_t)

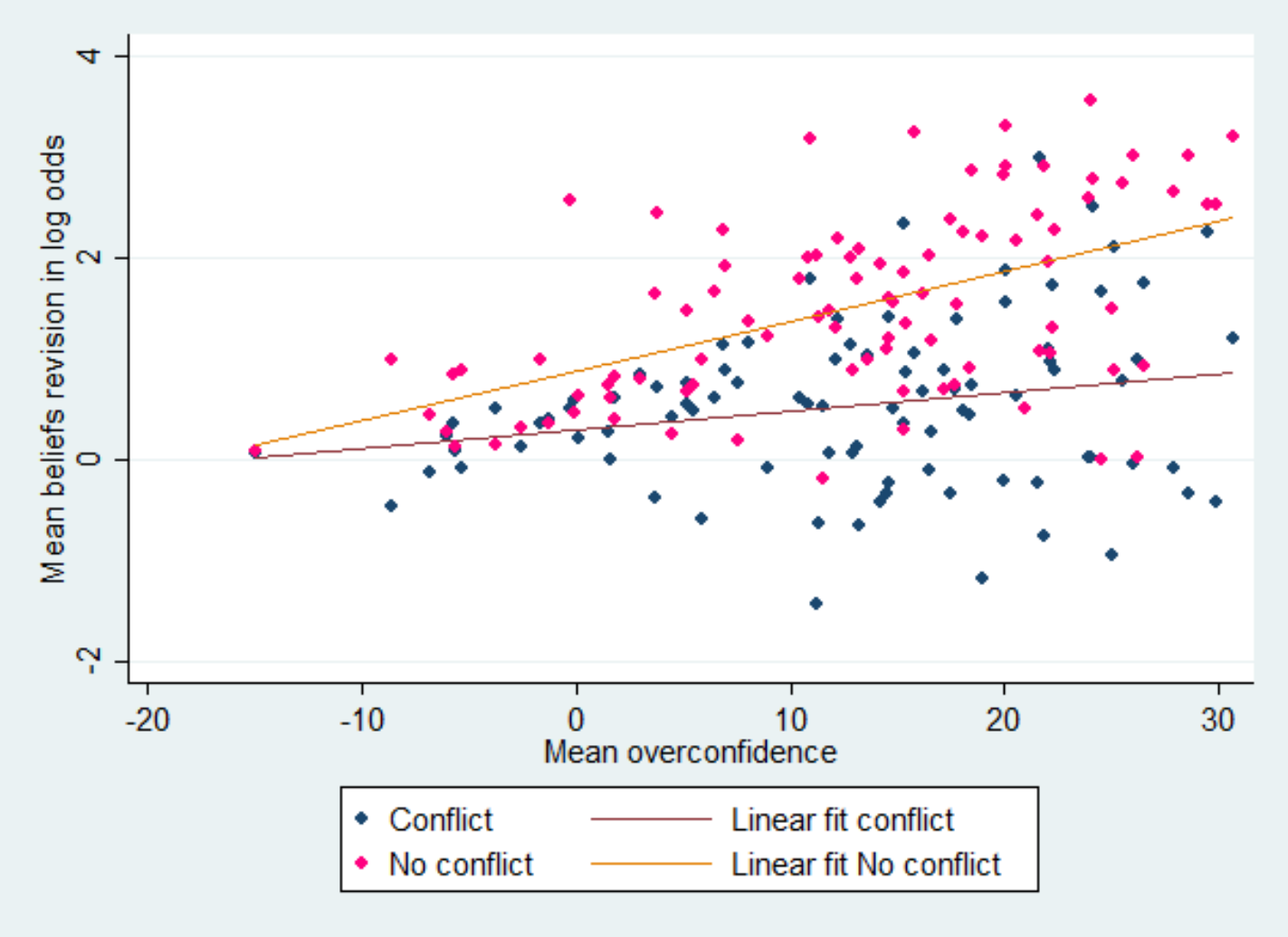
Egocentric bias: ***w_0*** estimated by conflict/non conflict x advisor x confidence level

Asymetric learning: λ estimated by conflict/non conflict x correct/incorrect

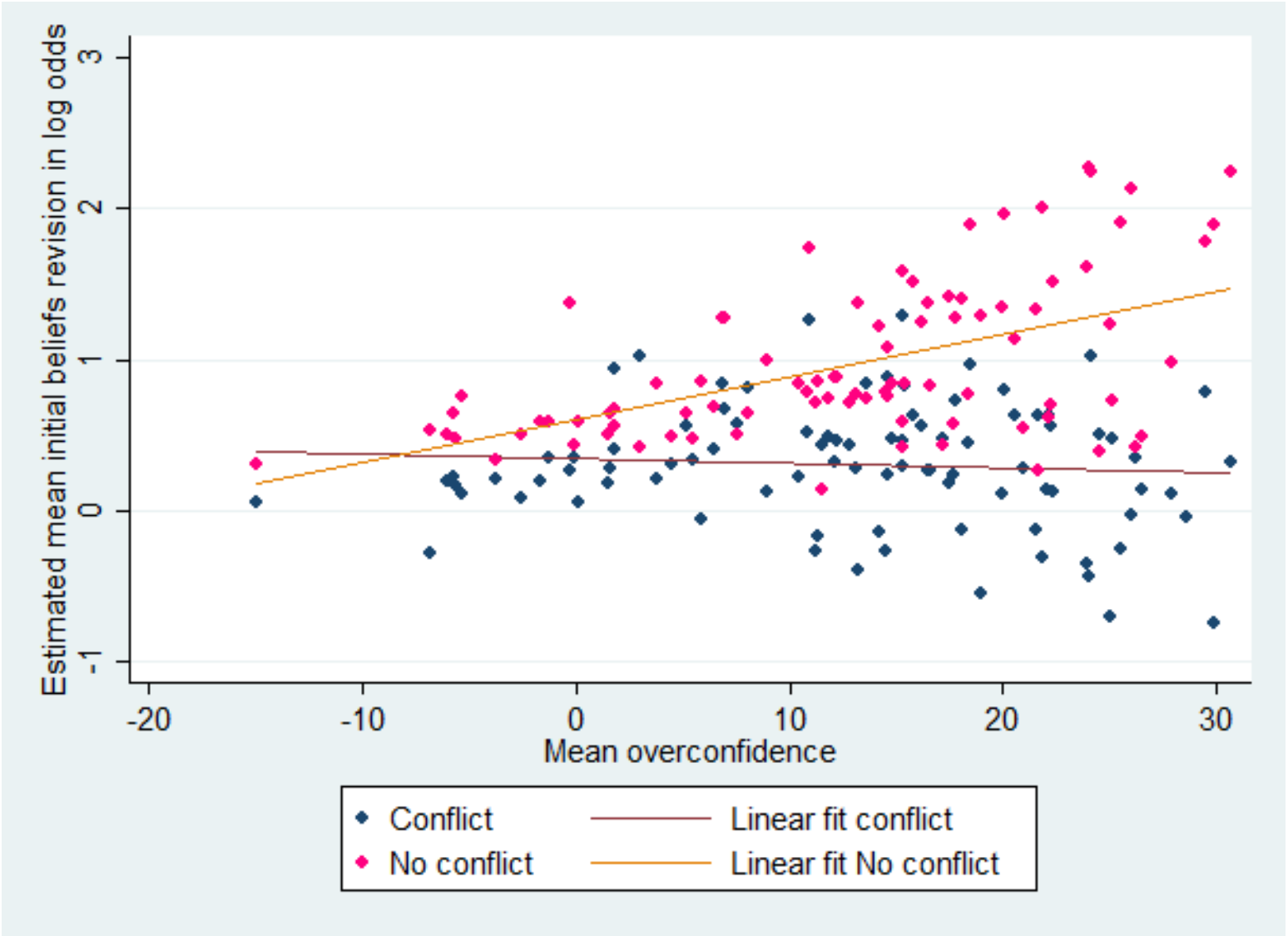
Estimation method

observed beliefs revision = w_t (advisor beliefs) + noise

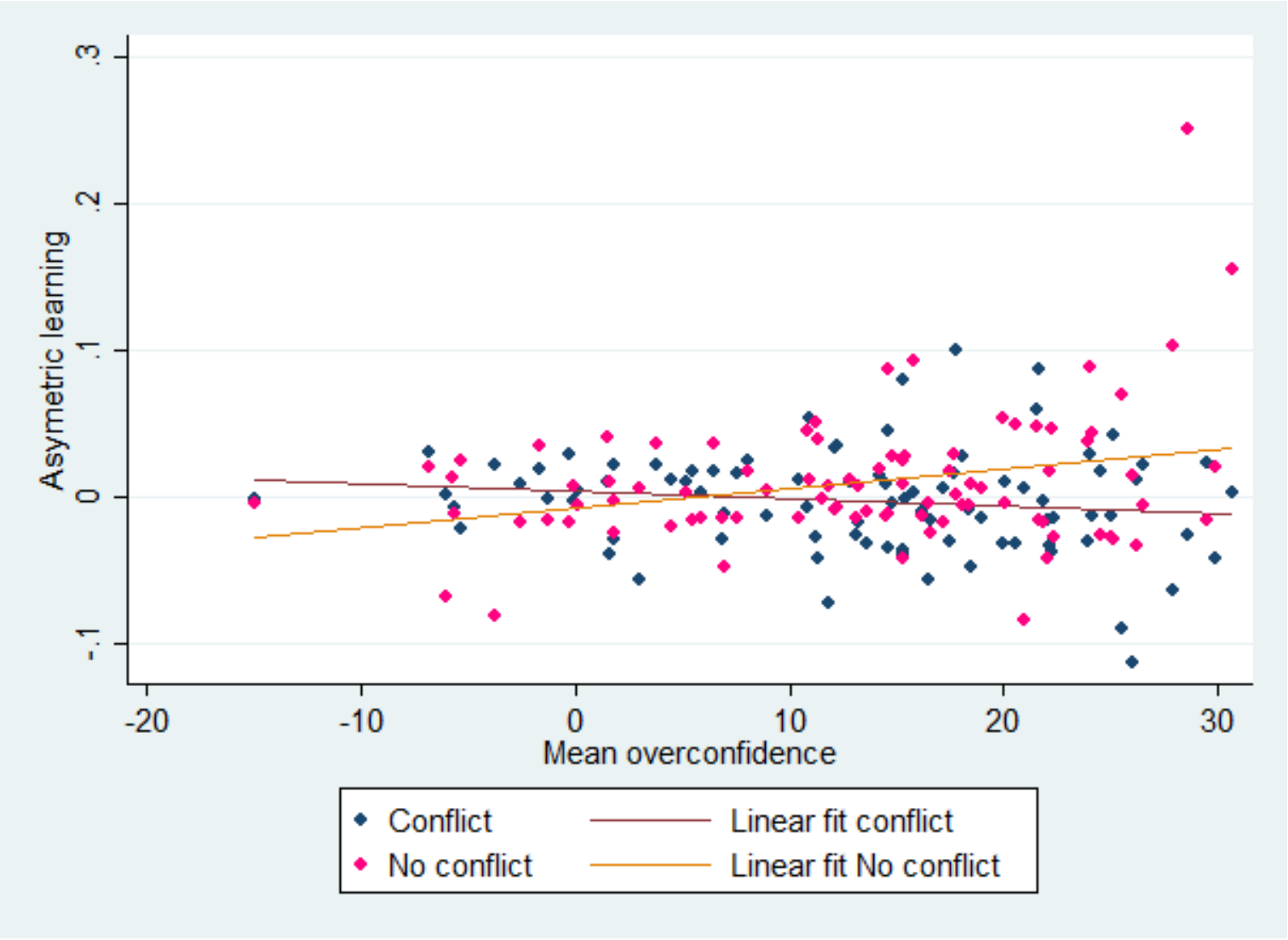
Overconfidence and observed belief revision



Overconfidence and egocentric bias?



Overconfidence and asymetric learning?



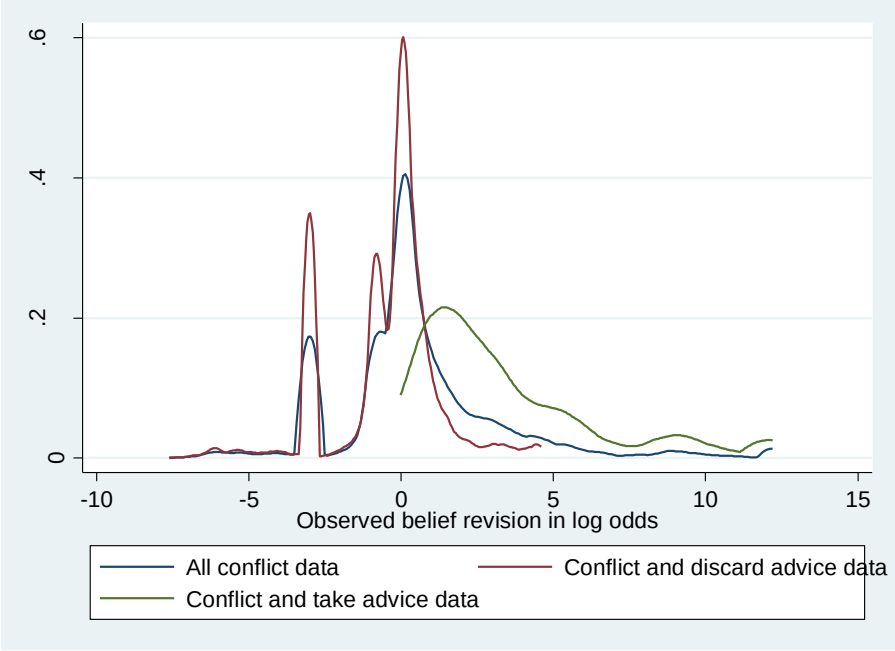
Thus

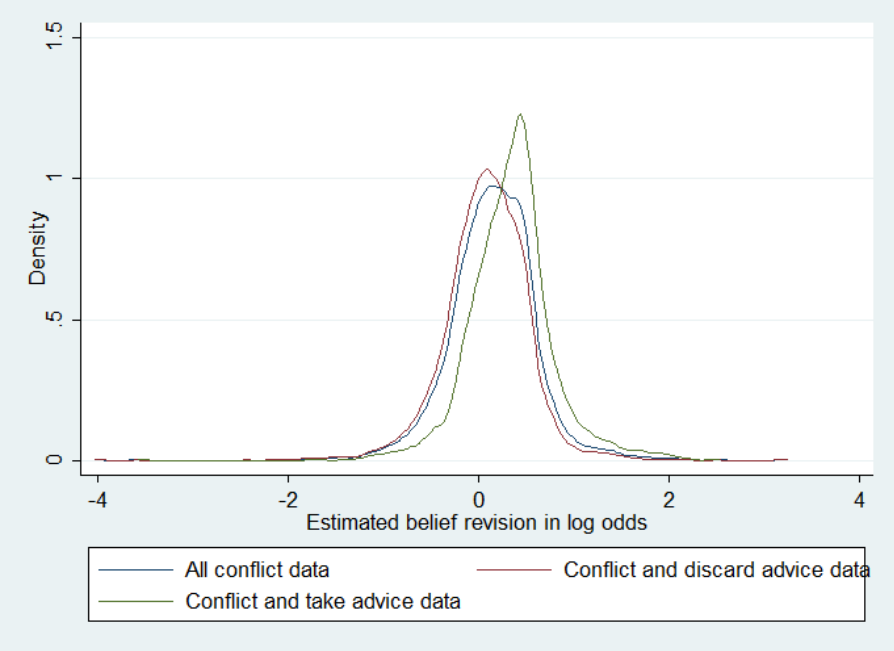
No success to save the «Literal Confidence» hypothesis with egocentric bias and asymetric learning

Data suggest to view overconfidence as a communication style

reported confidence = transformed internal confidence

Distribution of observed and estimated belief revisions





Any advice?