

Collective Intelligence in Human Groups

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The Collective . . .

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- Christopher Chabris, *Union College*
- Nada Hashmi, *MIT*
- Thomas Malone, *MIT*

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The Puzzle of Collective Intelligence



Ant Colony



Animal Herd

Flock of
Birds



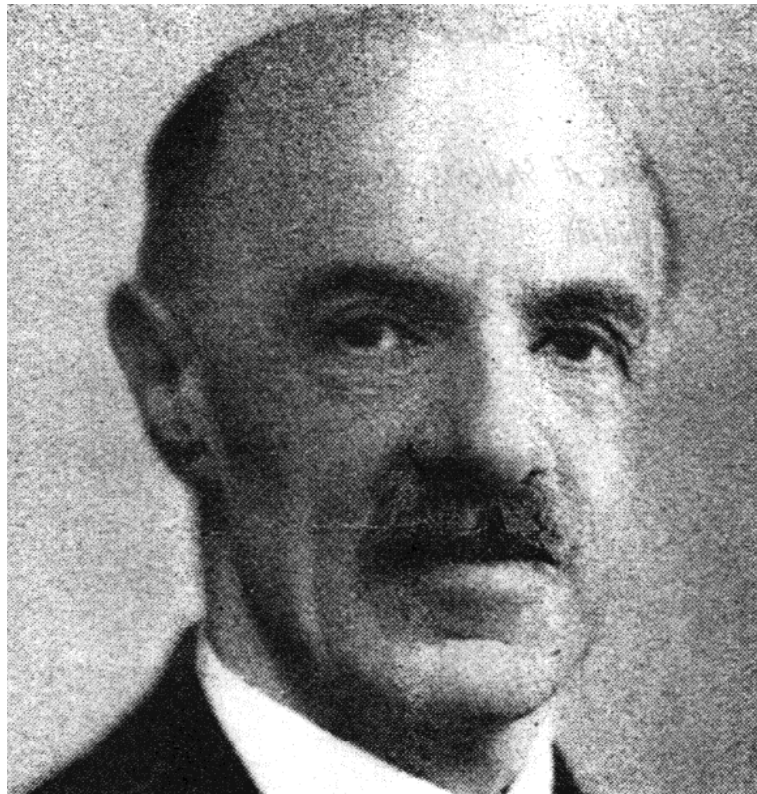
The Question

- Does general collective intelligence exist in human groups?



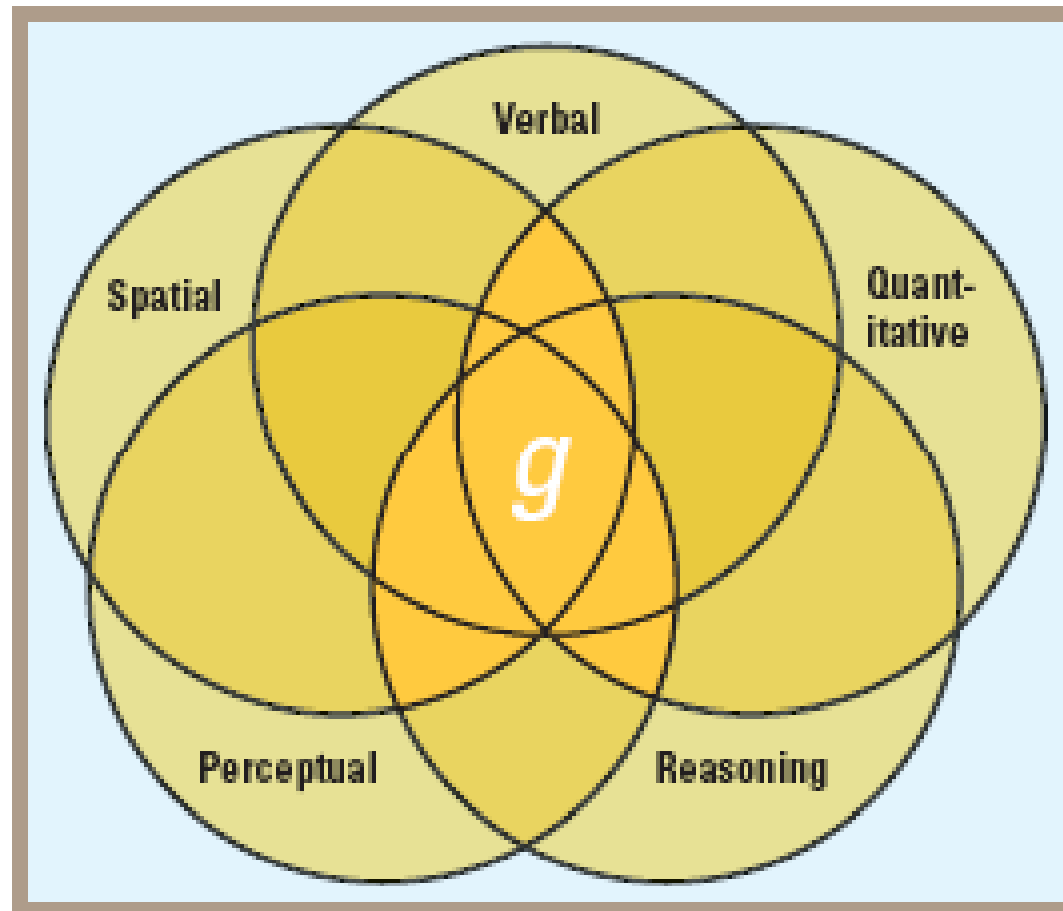
Individual Intelligence

- Spearman's g



Charles Spearman

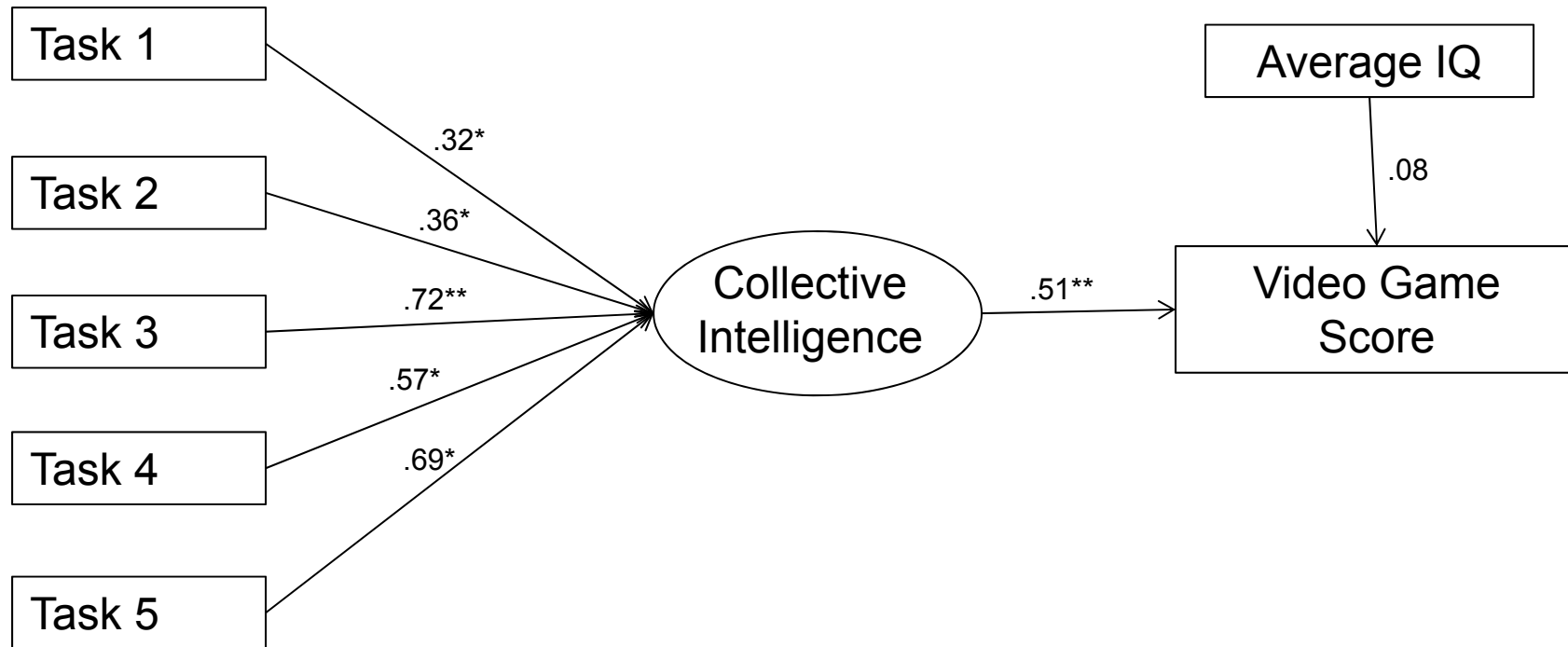
The “g-factor”



Collective Intelligence

- Is there evidence of a general collective intelligence (a “c” factor) in groups?
- Can we isolate a small set of tasks that is predictive of group performance on a broader range of more complex tasks?
- Does *c* have predictive validity beyond individual intelligence of group members?
- How can we use this information to build a better science of groups?

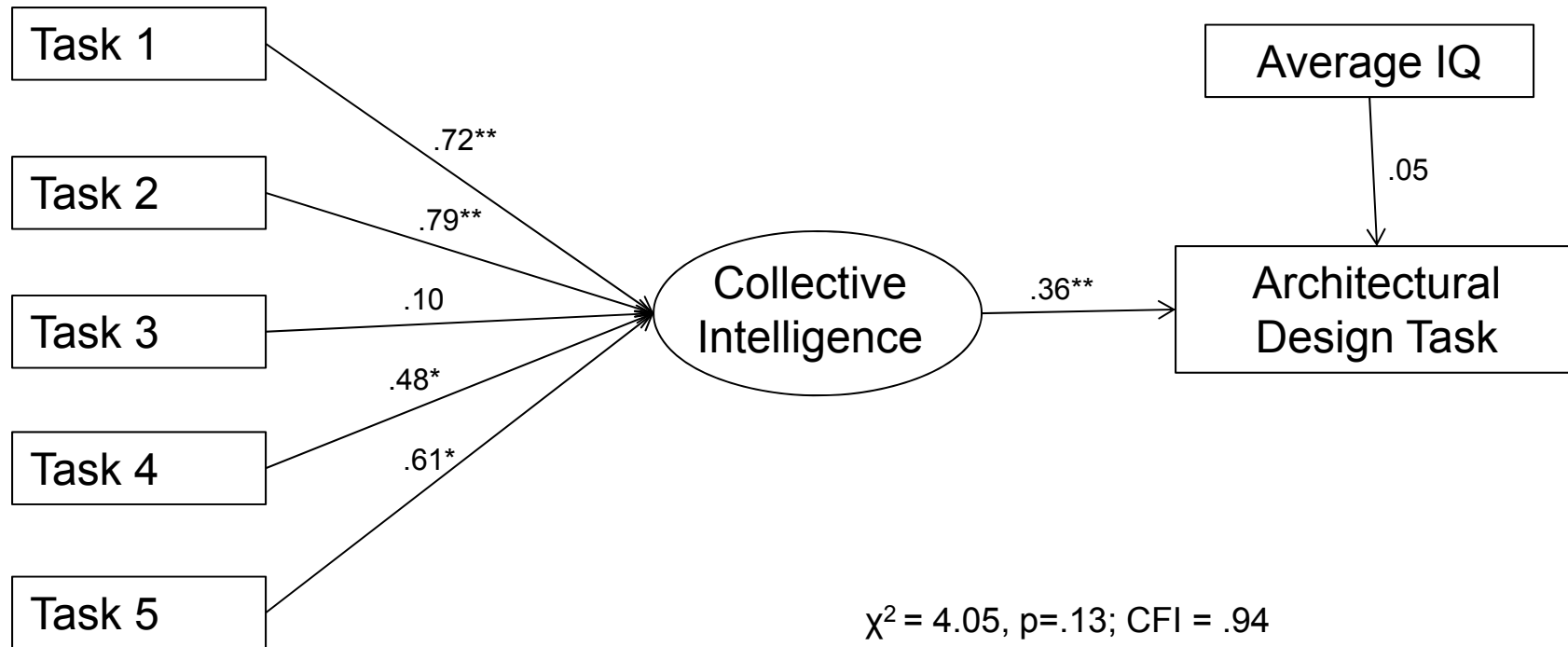
Study 1



$\chi^2 = 13.92$ $p = .45$; CFI = .99

Woolley, Chabris, Pentland, Hashmi & Malone, *Science*, 2010

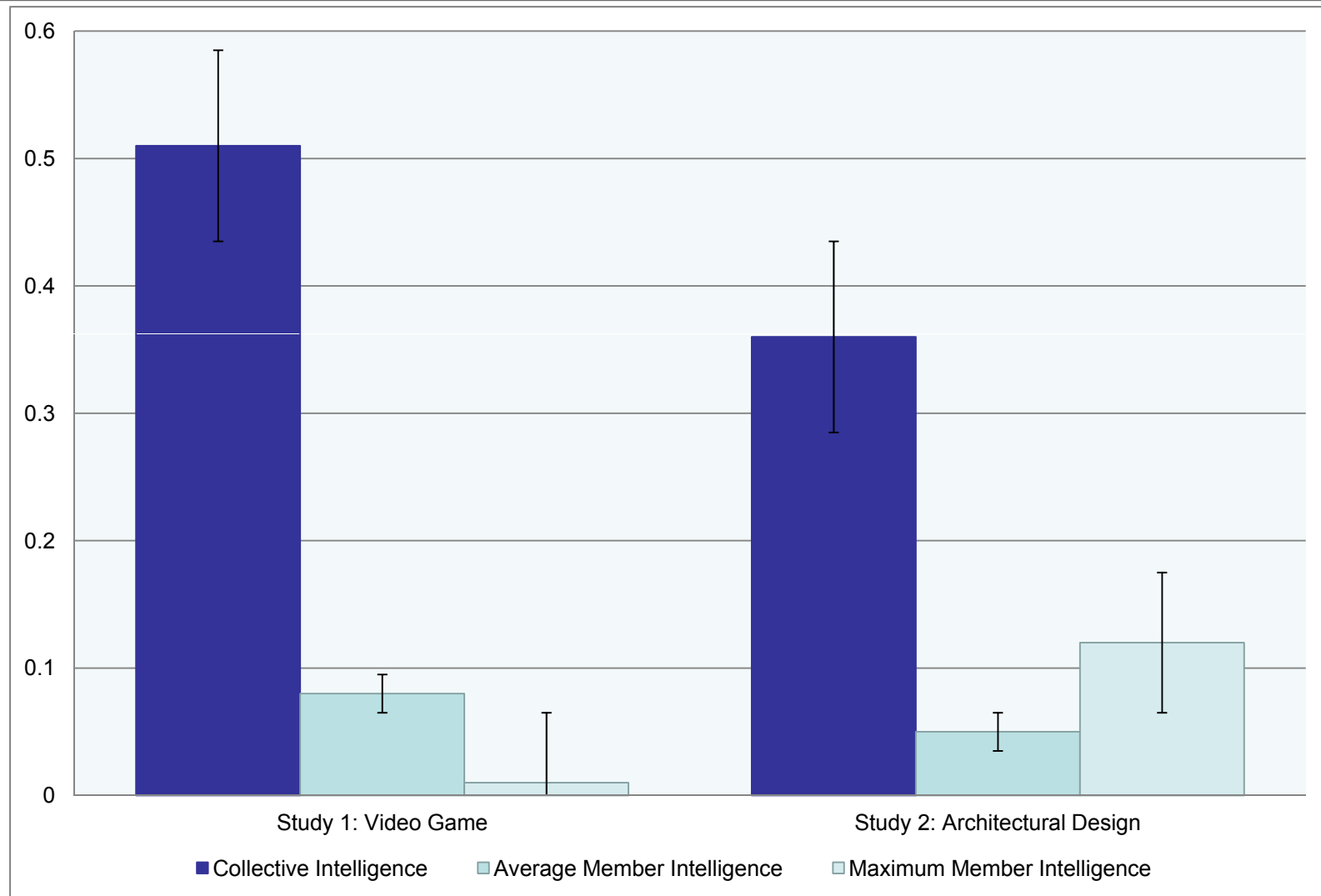
Study 2



107 groups of sizes 2, 3, 4, and 5

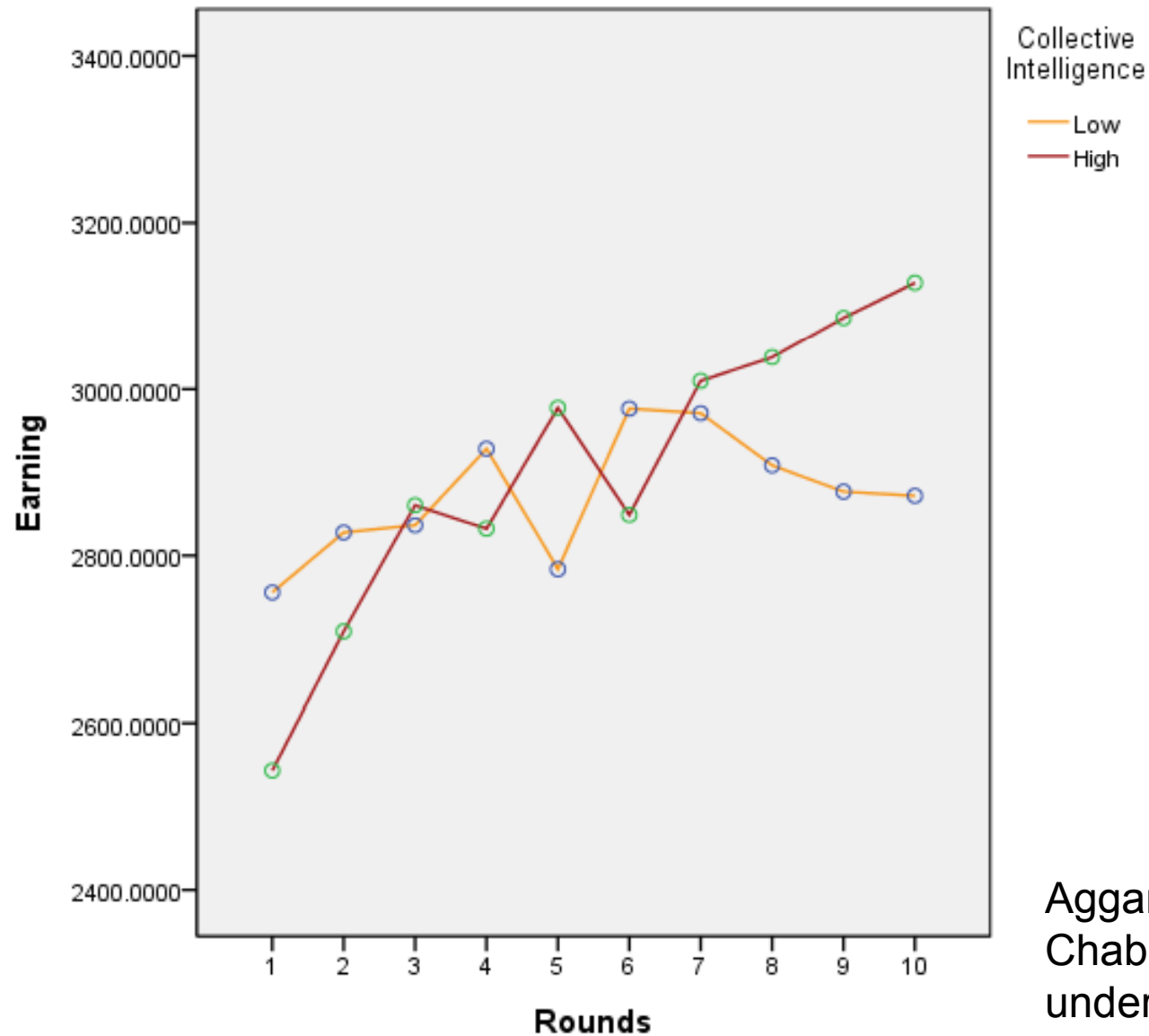
Woolley, Chabris, Pentland, Hashmi & Malone, *Science*, 2010

Predictive value of *c* and *g* factors



Woolley, Chabris, Pentland, Hashmi & Malone, 2010

Collective Intelligence & Learning



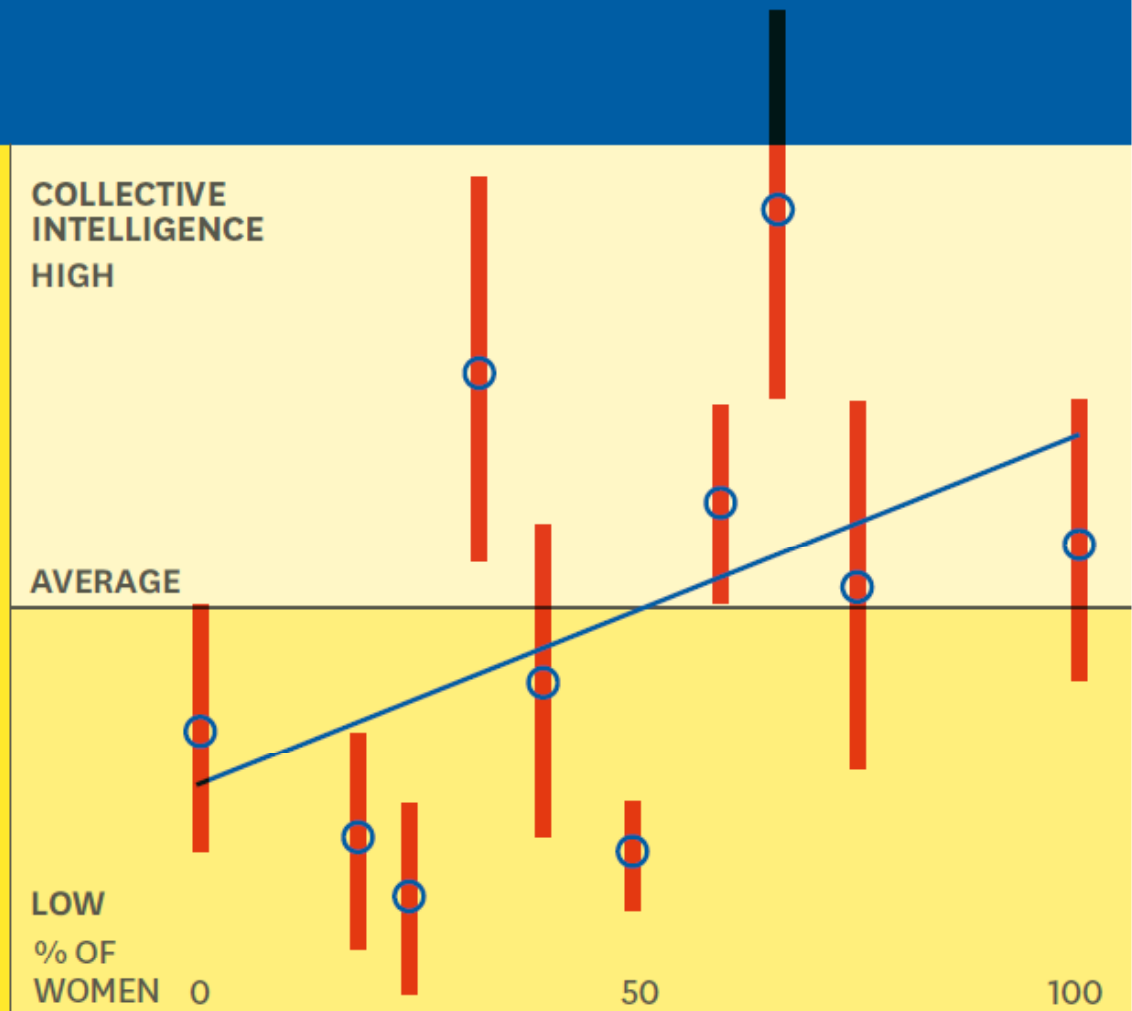
Aggarwal, Woolley,
Chabris & Malone,
under review

What Predicts Collective Intelligence?

- *Not* group satisfaction ($r = -.07$) cohesion ($r = -.12$), or motivation ($r = -.01$)
- *Not* personality
- Proportion of females in group ($r=.23, p<.05$)

The Female Factor

The chart plots the collective intelligence scores of the 192 teams in the study against the percentage of women those teams contained. The red bars indicate the range of scores in the group of teams at each level, and the blue circles, the average. Teams with more women tended to fall above the average; teams with more men tended to fall below it.



Source: *Harvard Business Review*

Why do women enhance c?

- Social sensitivity ($r=.26, p<.05$)

Social Sensitivity

Playful

Comforting

Irritated

Bored



What enhances c?

- Social sensitivity ($r=.26, p<.05$)
- Communication patterns

CI and Communication



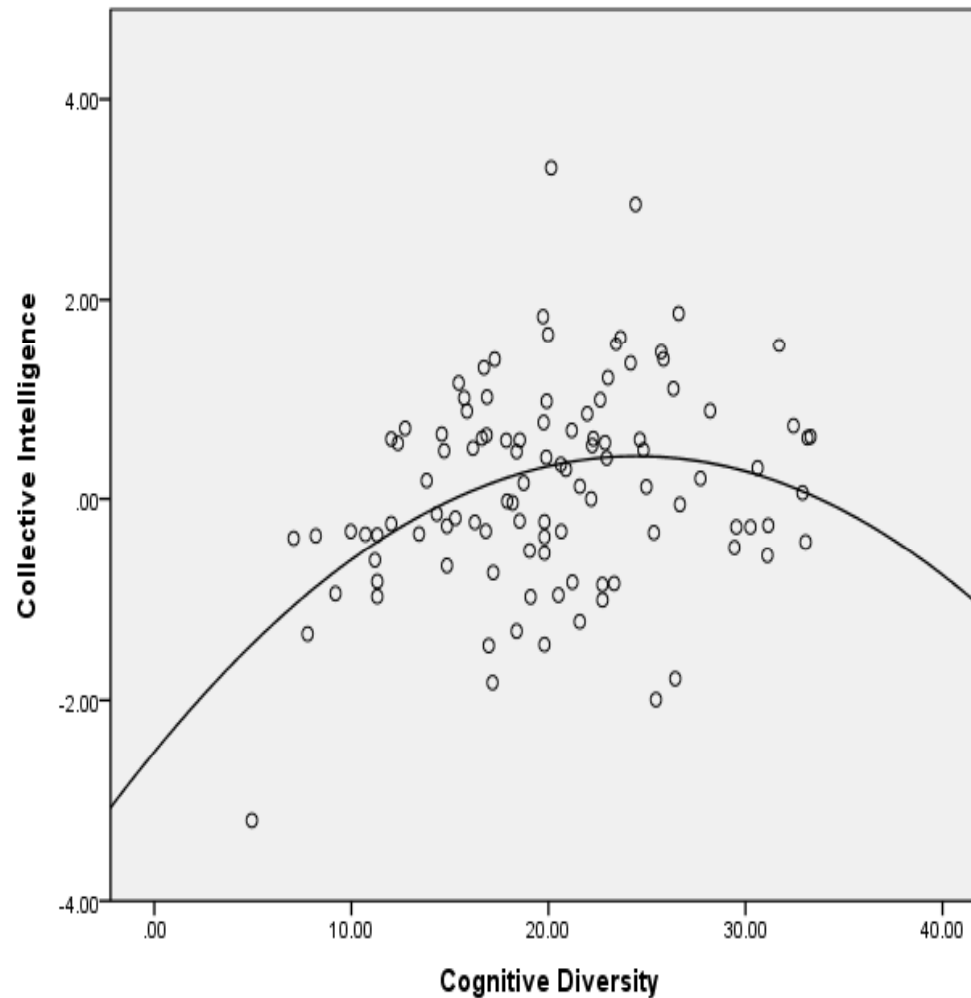
Sociometric Badge

- Uneven distribution in speaking turns negatively predicts c
- Higher proportion of women leads to more even distribution of speaking

What enhances c?

- Social sensitivity ($r=.26, p<.05$)
- Communication patterns
- Diversity

Cognitive Diversity & c



Aggarwal, Woolley, Chabris, & Malone, under review

Summary and Conclusions

- Our studies suggest that collectives exhibit a characteristic level of intelligence which is
 - distinct from skills of individual members
 - predictive of future performance
- Knowledge of c can enhance science of team performance
 - Provide a more robust dependent variable to use in studying the effects of tools and interventions

Future Directions

- Further explore what predicts c
- Use the C/I battery to predict team performance in other contexts
 - Groups in online environments
 - Teams in organizational settings
- Study interventions and tools that enhance the processes known to enhance c

Thanks!

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