

1. Abstract

The aim of this research was to investigate the changes in cognitive performance, confidence, and decision outcomes when people act in dyads (two-person groups) compared to when they act individually. Using a within-person design, dyads were significantly more confident, decisive (made more bets), and reckless (lost more bets) than when working alone. The results demonstrate the important role of individual differences: higher trait-confidence individuals became even more confident and decisive when working together than lower trait-confidence individuals working together. Thus, groups made more risky and erroneous decisions than individuals. However, individual trait-confidence may be targeted to alleviate these effects and guide the formation of more effective groups.

2. Background and Hypotheses

Groups generally perform better than individuals because group members share and use each other's subjective confidence to guide group judgements (Bahrami et al., 2010). Koriat (2015) extended this, showing that groups performed better for **consensually correct** (CC) items, however, groups performed worse than individuals for **consensually wrong** (CW) items. For CC items, most people select the correct answer than the wrong answer and they do so with higher confidence. For CW items (also known as "tricky" or "deceptive"), the majority of people select the wrong answer than the correct answer and they ALSO do so with higher confidence. A trait-confidence factor has been shown to exist, such that people tend to use the same relative confidence judgements regardless of the nature of the task (see Stankov et al., 2014 for review). Individual trait-confidence is suggested to influence collective decision-making. Schuldt et al. (2017) demonstrated that when two individuals with low trait-confidence were paired together the level of confidence in their joint responses increased considerably. For two individuals with mixed trait-confidence (one high & one low), dyadic confidence increased moderately. For two high trait-confidence individuals there was no difference in confidence for individuals and dyads. Individual trait-confidence is also suggested to influence decision-making outcomes. Individuals with higher confidence are more decisive and reckless than those with lower confidence (Jackson & Kleitman, 2014; Jackson et al., 2016, 2017). Based on signal detection theory, decisiveness is the proportion of hits and misses and recklessness is the false alarm rate.

Thus, our hypotheses are:

- 1a. Dyads will be more decisive (i.e., place more bets) than individuals, regardless of items being CC or CW.
- 1b. Dyads will be more reckless (i.e., greater false alarm rate) than individuals, regardless of items being CC or CW.
2. The increase in decisiveness (i.e., betting behavior; H1a) and recklessness (i.e., false alarm rate; H1b) for dyads will be higher when the dyad is composed of lower trait-confidence members.

3. Method

52 dyads, N=104 University students (80 female), $M_{age} = 20.08$, $SD = 4.57$, range: 16 – 48. Group Measure (each item completed individually then again as a dyad): General-knowledge test. Individuals and dyads also provided confidence ratings and a decision to bet on their answer for each item.

The bicycle was invented in Scotland? T/F

How confident are you that your answer is correct?

Would you bet \$10 on your answer being correct?

Other measures (completed individually): Raven's Adv Progressive Matrices, Esoteric Analogies, Mini-IPIP (Personality).

References

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4. Results

Accuracy: Dyads were not more accurate than individuals, $Mean Difference = -.60$, $F_{1,51} = .38$, $p = .54$.

Confidence: Dyads were significantly more confident than individuals, regardless of item consensuality, $Mean Difference = -3.00$, $F_{1,51} = 72.88$, $p < .001$.

1a. Decisiveness: Dyads were significantly more decisive (placed more bets) than individuals, regardless of item consensuality, $Mean Difference = -11.65$, $F_{1,51} = 63.94$, $p < .001$.

1b. Recklessness: Dyads were significantly more reckless (lost more bets) than individuals, regardless of item consensuality, $Mean Difference = -8.23$, $F_{1,51} = 15.62$, $p < .001$.

2. Trait-confidence: Results of 4 separate regression analyses demonstrated that higher trait-confidence individuals became even more confident ($F_{3,48} = 4.41$, $p = .04$) and decisive ($F_{3,48} = 4.92$, $p = .03$) than lower trait-confidence individuals working together. Trait-confidence did not reach significance for accuracy ($F_{3,48} = .41$, $p = .52$) or recklessness ($F_{3,48} = 4.03$, $p = .05$).

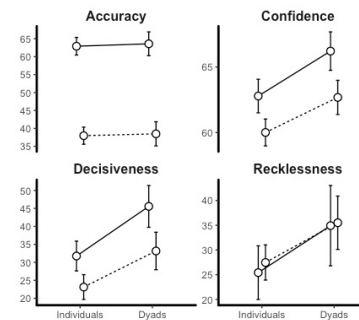


Figure 1. Mean score on general-knowledge test variables depending on grouping (individual vs dyad) and item consensuality (CC vs CW). Errors bars = 95% CI.

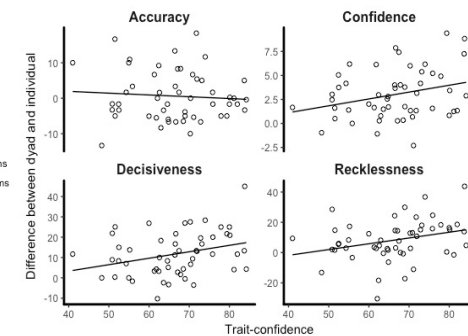


Figure 2. Change in mean score on general-knowledge test variables depending on the trait-confidence levels of the dyads members.

5. Discussion

- Groups appear to make more risky and erroneous decisions than individuals.
- The size of a groups increase in risky decision-making appears to depend on individual differences in trait-confidence. However, the direction of this effect was in the opposite direction to our prediction.

Implications: The risky decision-making of groups may be reduced by pairing individuals based on their trait-confidence, thus, improving group effectiveness.

Current directions: Matthew's PhD will investigate collective intelligence and collective metacognition.

Contact:

Matthew Blanchard (PhD Candidate)
School of Psychology
The University of Sydney
mbla2318@uni.sydney.edu.au