Cognitive Reflection in Multi-Issue Negotiation

Mihael A Jeklic

King’s College London Dickson Poon School of Law

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COGNITIVE REFLECTION IN MULTI-ISSUE NEGOTIATION

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Abstract

Suboptimal outcomes in negotiation have been associated with the implicit fixed-pie bias. The ability to correct this bias might be a critical capacity in negotiation and is often at the core of negotiation training. Cognitive reflection – an individual thinking disposition enabling people to suppress and override automatic responses – predicts performance in a variety of individual heuristics and biases tasks. A study \((N = 262)\) investigated whether cognitive reflection predicts negotiation outcomes and whether improvements associated with training are mediated by training-enhanced cognitive reflection of the participants. The results show that cognitive reflection predicts both an individual negotiator’s gain and all aspects of joint gain. Training enhances performance and is partially mediated by increased cognitive reflection. The findings support the proposition that cognitive reflection is an independent thinking disposition that underpins resistance to bias and improves outcomes in negotiation settings.

Keywords: cognitive reflection, negotiation, training, social psychology, decision-making

* Lecturer, Director of Professional Skills, King’s College London, mihael.jeklic@kcl.ac.uk.
We are not particularly good in making the most out of negotiation. In situations that allow creating value beyond what is immediately obvious, negotiators systematically and predictably fail to optimize by agreeing to lose-lose features (Thompson & Hrebec, 1996), leaving value on the table and reaching impasse (Raiffa, 1982; Thompson, 2005). The quality of outcomes has been considered a function of negotiators’ social motivation and resistance to yielding (Druckman, 1994; Pruitt & Rubin, 1986), their social and epistemic motivation (De Dreu, Beersma, Stroebe, & Euwema, 2006; De Dreu, Koole, & Steinel, 2000; Van Kleef, De Dreu, & Manstead, 2004), their mental models or orientations (Bazerman, Curhan, Moore, & Valley, 2000; Menkel-Meadow, 1983; Van Boven & Thompson, 2003) and their mixed motives (Lax & Sebenius, 1986; Mnookin, 2000; Murnighan, Babcock, Thompson, & Pillutla, 1999).

However, the dominant approach to understanding outcome suboptimality has been the behavioral decision perspective (Bazerman & Neale, 1991, 1992; Neale & Bazerman, 1992) that views the negotiators’ inability to maximize outcomes as the result of biased decision-making. The key cognitive failure is the fixed-pie bias: negotiators tend to assume their interests are in direct conflict with the interests of the other side, leading to competitive behaviors and unexplored value (Bazerman & Neale, 1992; Pinkley, Griffith, & Northcraft, 1995; Thompson, 1991; Thompson & Hastie, 1990; Thompson & Hrebec, 1996). Effective training in negotiation more or less explicitly addresses this critical bias by urging negotiators to look beyond the salient features and generate value (Nadler & Thompson, 2003; Patton, 2009; Van Boven & Thompson, 2003).

Forty years of a separate ‘heuristics and biases’ line of research documented systematic violations of rationality in a wide array of individual thinking tasks (e.g., incorrect probability assessments, faulty hypothesis testing, context dependency, framing; Kahneman,
This research also identified a thinking disposition (‘cognitive reflection’; Frederick, 2005) – enabling people to override automatic (biased) intuitions with deliberative thinking – that provides a measure of protection against bias. However, the research on cognitive reflection has been limited to individual decision-making tasks rather than tasks involving strategic interdependence. The present study extends this research to negotiation.

To the extent the fixed-pie bias is the key barrier to efficiency in negotiation, cognitive reflection might be a critical capacity for negotiators. We investigate, first, whether cognitive reflection predicts individual and joint negotiation outcomes, and second, whether the positive effects of negotiation training are mediated by training-enhanced cognitive reflection of the participants.

Cognitive reflection in independent thinking tasks

Contemporary dual-process theories (for an overview see Stanovich, 2011) see decision-making in terms of a power-expense tradeoff between automatic and controlled cognition, where the default outputs of the former system can be intervened on by the latter (Evans & Stanovich, 2013; Kahneman, 2011; Stanovich, 2011). The heuristic-based automatic cognition rapidly and effortlessly processes a large amount of information and its first approximations tend to be sufficiently accurate most of the time, particularly in ‘benign’ environments (Kahneman & Klein, 2009). However, they tend to be predictably and systematically off-mark in complex tasks (Kahneman, 2011) and need to be overridden by serial controlled computation. Because controlled processes involve high computational cost, people experience them as aversive and tend to default to automatic processes (the ‘cognitive miser’ phenomenon; Frederick, 2005; Kahneman, 2011; Stanovich, 2011; Stanovich, West, & Toplak, 2016; Toplak, West, & Stanovich, 2014).
The degree of miserliness in information processing is different among people. The Cognitive Reflection Test (the 'CRT'; Frederick, 2005) is the quintessential measure of the capacity to detect conflicting responses of automatic and controlled systems. For example, its item ‘if a bat and a ball jointly cost $1.10, and the bat costs $1 more than the ball, how much is the ball?’ is difficult not because it requires any complicated calculation, but because it demands detecting that the automatic answer (10 cents) that ‘springs “impulsively” to mind’ (Frederick, 2005, p. 27) needs to be checked and corrected by controlled thinking (to arrive at the correct answer of 5 cents). The CRT predicts performance in a wide array of independent thinking tasks better than assessments of cognitive ability, thinking dispositions, and executive functioning (Cokely & Kelley, 2009; Oechssler, Roider, & Schmitz, 2009; Toplak, West, & Stanovich, 2011). This research however investigates the impact of cognitive reflection on performance in individual thinking tasks (for an overview of thinking problems see West, 2011) that do not involve strategic interaction and mixed motives. The following section discusses a potential impact of cognitive reflection in mixed-motive negotiation.

**Cognitive reflection in (mixed motives) multi-issue negotiation**

While negotiations normally carry the potential to create value beyond what is immediately obvious (Deutsch, 1973; Pruitt & Rubin, 1986; Walton & McKersie, 1965), negotiators assume the contrary. The critical bias identified by the decision perspective research is that the value in negotiation is fixed (the ‘fixed-pie’ or ‘zero-sum’ assumption), which leads the parties to focus on the competitive distributive aspects of the interaction and leave value creation out of focus (see e.g., Bazerman, MaglioZZi, & Neale, 1985; Bazerman & Neale, 1986, 1991; De Dreu et al., 2000; Menkel-Meadow, 1983; Neale & Bazerman, 1992; O’Connor & Adams, 1999; Pinkley et al., 1995; Thompson, 1991). A related bias is that negotiators’ interests cannot be compatible (i.e., if I want something, the counterparty will
oppose that) and causes lose-lose agreements where the parties both prefer one option, but settle for another (Thompson & Hrebec, 1996).

These assumptions are a potent barrier to outcome efficiency because the critical information about payoffs is asymmetric. To generate value by trading (i.e., 'logrolling' to capture 'integrative gain'; Froman & Cohen, 1970) or identifying jointly-preferred options ('compatible gain'; Thompson & Hrebec, 1996) negotiators need to focus on and utilize the correct aspects of not only their own, but also their counterparties’ payoffs, which they do not know. The information exchange is fraught with risk and often obfuscated by competitive tactics (Lax & Sebenius, 1986; Mnookin, 2000; Murnighan et al., 1999), and the imparted information is difficult to verify (Bond, 2008; Bond & DePaulo, 2006; Depaulo et al., 2003; Hartwig & Bond, 2014; Sporer & Schwandt, 2007). The fixed-pie bias in such ambiguous and uncertain ('fuzzy'; De Dreu, Beersma, Steinel, & Van Kleef, 2007) situations focuses the negotiators’ attention and efforts squarely on the competitive distributive tactics, thus depressing joint value. These ‘faulty assumptions about the counterparty and the negotiation situation’ are seen as the key culprit for suboptimal outcomes in negotiation (e.g., Thompson, 2005, p. 95).

The proposition we test in this paper is that the fixed-pie bias (and its close cousin the incompatibility bias) is the automatic but erroneous intuitive response given by automatic processes to the more or less explicit question about the counterparty’s preferences, which leads to erroneous perceptions about value potential in negotiation and competitive interaction. These outputs can be, but are often not, detected and corrected by the negotiators’ controlled cognitive effort.

The first part of this study tests whether the metacognitive capacity to detect a potential conflict between the automatic response (the fixed-pie bias) and controlled cognition predicts (i) individual gain and (ii) the two components of dyadic gain that require negotiators to exploit the differences in payoffs (that is, integrative and compatible gain). In the second part, we investigate the role cognitive reflection has in negotiation training. To
the best of our knowledge, no study has so far tested the impact of cognitive reflection on negotiation outcomes.

Cognitive reflection and negotiation training

Training improves negotiation performance (Lewicki, 2014; Movius, 2008; Patton, 2009; Thompson, 1991). The effects seem to last (Coleman & Joanne Lim, 2001; Soliman, Stimec, & Antheaume, 2014) and correlate with the intensity of the training (ElShenawy, 2010; Thompson, 1991). Observational and analogical learning are more effective than didactic learning or learning by information revelation (Nadler & Thompson, 2003), and experience-based negotiation training outperforms instruction-based training (Van Boven & Thompson, 2003).

Because the fixed-pie assumption is the critical barrier to efficiency, training needs to correct this bias. Even the most basic education in interest-based negotiation is effectively a call to engage explicit cognition and look beyond the salient features of the negotiation: ‘focus on interests, not positions’ (Fisher, Ury, & Patton, 1991); in the classic anecdote, two quarreling men in the library can achieve a win-win outcome only by moving beyond the initial zero-sum frame (p. 40; originally in Follet, 1925). Prescriptive advice for creating value – e.g., to systematically prepare; to take the counterparty’s perspective and identify value-creating options (e.g., Patton, 2005); to dovetail differences; to add issues to negotiation; and to make simultaneous offers (e.g., Lax & Sebenius, 2006) – is more or less explicitly aimed at revising the assumption that the value is fixed.

Even when not focused specifically on changing mindsets (c.f., Ade, Schuster, Harinck, & Trötschel, 2018), training changes how negotiators understand the negotiation game. Van Boven and Thompson (2003) found that the mental models of beginner negotiators who managed to reach optimal agreements reflected greater understanding of the payoff structure,
and the processes of trading and information exchange, than their peers who failed to optimize. In addition, the mental models of negotiators who received training were similar to the models of beginner negotiators who reached optimal settlements, except that they were more abstract.

In this study, we (i) control for training when testing the impact of cognitive reflection on outcomes, and (ii) test whether cognitive reflection mediates the relationship between training and outcomes.

Present study

A trained and untrained group of participants performed a multi-issue negotiation task and were assessed on cognitive reflection. We expected that (i) training would increase all aspects of joint gain, (ii) cognitive reflection would predict dyadic and individual gain in negotiation, and (iii) cognitive reflection would mediate the impact of training on dyadic outcomes.

Method

Participants and procedure

The participants \((N = 262)\) were law students at a large university in the United Kingdom. The untrained group \( (n = 172, \text{64\% female, age 21 - 37} )\) was recruited from the graduate population during the first week of their masters’ course. The trained group \( (n = 90)\) was recruited from graduate \( (n = 42, \text{64\% female})\) and undergraduate students \( (n = 48, \text{67\% female})\) that participated in our negotiation courses.\(^1\)
The participants were randomly paired up within their group, prepared the case for up to 20 minutes and negotiated for 30, after which they filled out the contract form and the CRT. They received no compensation for their involvement. The university ethics board granted the approval for the study.

Post hoc power analysis with G*power (Faul, Erdfelder, Lang, & Buchner, 2007) showed that this study’s sample size had >99% power to detect the effects of a multiple linear regression with three predictors at alpha $p = .05$.

**Training**

Prior to the study, the trained group engaged in a number of negotiation simulations and received a mix of didactic- and discussion-based lessons in the game-theoretic cooperation-competition model of negotiation (Lax & Sebenius, 1986), principled (interest-based) negotiation (Fisher et al., 1991), competitive tactics for distributive negotiation (Lax & Sebenius, 2006), and the three-tensions model (Mnookin, 2000). The participants have received no specific training in logrolling techniques and have completed no multi-issue scorable tasks prior to the experiment.

**Negotiation task**

The task was a multiple-issue employment negotiation common in negotiation research (e.g., Galinsky, Maddux, Gilin, & White, 2008; Maddux, Mullen, & Galinsky, 2008; Thompson, 1991; Thompson & Hastie, 1990). To reach an agreement, the parties must agree eight issues, each with five possible options worth different numbers of points (Table 1). Two issues are distributive (zero-sum), two are compatible (the parties’ payoffs are identical) and the remaining four are integrative (the payoffs are relatively different and allow logrolling). The instructions state that the payoff schedules must not be shown to the counterparty.
Outcome variables were negotiators’ individual gain, and dyadic joint, integrative and compatible gains. Predictors were a binary variable indicating whether the participant received training, and individual and dyadic (summed) scores from the CRT (Frederick, 2005). We used the CRT because extensive research demonstrates it is a unique predictor of performance in a wide array of decision-making tasks, superior to assessments of cognitive ability, thinking dispositions, and executive functioning (Campitelli & Gerrans, 2014; Campitelli & Labollita, 2010; Cokely & Kelley, 2009; Liberati, Reyna, Furlan, Stein, & Pardo, 2012; Oechssler et al., 2009; Toplak et al., 2011). We found CRT particularly appropriate for this study because it measures the ability to suspend and override an immediate and attractive (and erroneous) solutions generated by each item (e.g., 10 cents in
the ‘Ball and Bat’ item), which mirrors the immediate and attractive fixed-pie assumption in negotiation settings.

**Data analysis**

In instances of impasse the dyadic values for joint and integrative gain were replaced with the minimum scores in the group. We first tested the impact of training on the outcome variables, and followed with the regression of gains on CRT and training. For individual gain, we performed hierarchical regression with dyad as random effect. For mediation analysis we used Stata’s SEM and PROCESS macro for SPSS (Hayes, 2020) and estimated the confidence intervals by bootstrapping 5000 samples.

**Results**

**Training**

Training increased all aspects of dyadic gain; one-way MANOVA showed a significant effect on both adjusted compatible and integrative gain; $F(2, 128) = 14.25, p < .001, \Lambda = .82$. Contrast analysis is in Table 2.

Table 2. Contrast analysis of adjusted joint, integrative and compatible gains between trained and untrained samples.

<table>
<thead>
<tr>
<th></th>
<th>Joint gain</th>
<th></th>
<th>Integrative gain</th>
<th></th>
<th>Compatible gain</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N$ $M$ $SD$</td>
<td>$M$ $SD$</td>
<td>$M$ $SD$</td>
<td></td>
<td>$M$ $SD$</td>
<td></td>
</tr>
<tr>
<td>Untrained</td>
<td>86 8,560 2,698</td>
<td>10,897 3,165</td>
<td>1,263 1,228</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained</td>
<td>45 10,787 1,954</td>
<td>12480 1,729</td>
<td>1,907 934</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$t$</td>
<td>5.60</td>
<td>5.15</td>
<td>2.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$p$</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>.002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$d$</td>
<td>.901</td>
<td>.979</td>
<td>.472</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The test statistic is Welch-adjusted $t$-test (single-tailed). Results remain significant if adjusted for multiple comparisons.
Trained negotiators outperformed their untrained peers by 29% in (unadjusted) joint gain, resulting from a 21% improvement in (unadjusted) integrative gain and a 33% increase in compatible gain (Figure 1).

Figure 1. Joint gain, integrative gain and compatible gain as percentage of optimal outcome in untrained and trained groups (unadjusted)

Cognitive reflection

Dyadic CRT was predictive of joint gain and its components integrative and compatible gain when controlled for training (Table 3). There was no interaction between the terms.

A mixed-effects (hierarchical) regression with individual CRT scores and training as predictors and dyad as the random effect was significant; $Wald(2) = 36.23, p < .001$. Both individual CRT scores ($\beta = 313.54$, 95% CI [76.42, 550.65], $p = .010$) and training ($\beta = 1044.71$, 95% CI [637.05, 1452.38], $p < .001$) were predictive. There was no interaction between the terms ($p = .67$).
As expected, the relationship between training and joint gain was partially mediated by dyadic CRT; $F(1, 129) = 24.00, p < .001, R^2 = .157$ (Figure 2).
Training predicted the CRT scores; $\beta = .97$, 95% CI [.31, 1.63], $z = 2.88$, $p = .004$. The indirect effect was significant and explained 19.5% of the total effect; $\beta = 433.45$, 95% CI [117.24, 830.17]. The direct effect of training on outcomes remained significant; $\beta = 1792.75$, 95% CI [915.29, 2670.21], $z = 4.09$, $p < .001$.iii

**Discussion**

The results of this study extend cognitive reflection research to situations involving mixed motives and strategic interdependence. These novel findings have considerable practical importance because of the pervasiveness of negotiation in human affairs, the vast amount of value at stake, and our poor record of value optimization, wasted resources, incurred social costs and increased conflict (Pruitt & Rubin, 1986).

Cognitive reflection was a significant predictor of dyadic and individual gain in a multi-issue scorable negotiation task. To the extent that the implicit fixed-pie assumption is the major barrier to efficient outcomes, suppressing and overriding this assumption is a *sine qua non* for value creation, and the ability to detect that such suppression and override are necessary – cognitive reflection – is a key trait of an effective negotiator. To some degree, this insight is not surprising. The capacity to take a mental step back and think outside of the zero sum-
frame to generate value has long been considered a key trait of an effective negotiator (e.g., the window in the library example; Fisher et al., 1991; Follet, 1925). Several studies have also indicated that the CRT may measure a cognitive trait that includes more characteristics than originally suggested by Frederick (2005). Instead of assessing only the relatively narrow capacity to detect potentially asynchronous outputs of automatic and controlled systems, the CRT may capture the more general disposition to suppress impulsiveness and conduct an elaborative domain-specific heuristics search in situations where normative models are unavailable (Campitelli & Labollita, 2010; Cokely & Kelley, 2009). Such open-mindedness would facilitate adaptive action in unencountered contexts such as novel negotiation tasks.

The fixed pie bias is a particularly potent barrier to maximizing integrative gain, which is where we found the strongest effect of cognitive reflection. To logroll, a negotiator must realize there are differences between their own payoffs, which they know, and the counterparty’s, which they do not. If the pie is assumed to be fixed, there is no need to pay attention to payoffs and explore whether additional value could be created by trading on differences. It is worth noting that detecting the need to examine this assumption is essential, but only does half of the job: unlike in heuristics and biases tasks, a negotiator cannot work out the solution alone, but needs to interact with the counterparty and exchange information, which is subject to the information dilemma and verification problems (e.g., Depaulo et al., 2003; Lax & Sebenius, 1986; Murnighan et al., 1999).

Identifying compatible issues is a tad more random than optimizing integrative gain. The compatible option is the best outcome for both parties (choosing any other option is a 'lose-lose' agreement; Thompson & Hrebic, 1996). While a reflective detection and override of the incompatibility bias will likely lead to optimization, it is not necessary as the parties can stumble upon the correct solution by chance when one party one-sidedly discloses their general preferences on the issue (Loschelder, Swaab, Trötschel, & Galinsky, 2014). This is likely the reason for the weaker effect of cognitive reflection on compatible gain that we found in our study.
The findings of this study also add to research showing that education improves outcomes in negotiation, by demonstrating its impact on the components of joint gain. Training improved mean joint gain by 29%, resulting from a 21% increase in integrative and a 33% increase in compatible gain.

Our prediction that training is effective to the extent that it brings cognitive reflection to the fore was only partially supported by the results. While training did increase the CRT scores, the mediation was partial: the indirect effect was in the region of 20 percent of total effect of training on outcomes. We interpret these results as follows. While suspending the output of automatic processes is procedural, it is difficult to separate process and knowledge considerations in decision-making tasks; the mindware plays a critical part (Stanovich, 2011; Stanovich et al., 2016). A person who has been trained that negotiation situations may appear zero-sum but often carry hidden value potential (Van Boven & Thompson, 2003) is more likely to detect that their immediate fixed-pie perception needs a controlled cognitive check than a person who has not received such training. This would explain the mediation effect.

At the same time, stimulus discriminations, and decision-making rules and principles that have been practiced to automaticity can be part of the implicit cognition (Kahneman & Klein, 2009). In other words, a trained negotiator’s automatic investigation of interests and an eager student’s blind following of the instruction to ‘make multiple offers’ may be uncorrelated with their general tendency to resist miserly processing and engage cognitive reflection. While such heuristic tricks of the trade are grounded in the recognition of how incorrect the fixed-pie bias is, their application does not require cognitive reflection. This raises interesting possibilities for future research. For example, can cognitive reflection be trained with lasting results? Which components of negotiation training increase it? Would negotiators who use cognitive reflection be more effective than the ones using heuristic tricks of the trade in novel situations (e.g., settling a legal dispute, negotiating a border, diffusing a hostage situation or agreeing a ceasefire in a military conflict)?

The current research has several limitations. First, although the findings lend general support to the proposition that cognitive reflection improves outcomes because it enables higher-
level cognitive override of the implicit fixed-pie bias, the study correlated outcomes with CRT scores rather than with any record of the hypothesized cognitive processes. We did not administer questionnaires about implicit processes during the negotiation to avoid providing hints to participants that could interfere with the experiment, and have not conducted a post-negotiation survey because participants’ self-reports of such implicit processes tend to be unreliable (Nisbett & Wilson, 1977). Future studies might consider tackling this challenge using qualitative methods to tease out the processes that enable dyads with higher CRT scores to capture higher dyadic gains.

Second, the task we used deviates from real-life bargaining in important ways. This limits the generalizability of the findings. However, multi-issue tasks with asymmetric payoffs, like the task used in this study, have been an effective research tool in the field. The consensus in the research community seems to be that while the magnitude of the observed effects may not be directly generalizable, the results themselves are likely to replicate in natural settings (De Dreu & Carnevale, 2005).

Third, the improved results in the trained group may be partly due to an epistemic understanding of negotiation as carrying integrative potential that the negotiators shared at the dyadic level (i.e. both negotiators knew they attended the same training advocating negotiation as commonly containing hidden value). This may have resulted in a tacit value-claiming ceasefire that allowed negotiators to explore options boosting integrative and compatible gain. To the extent such epistemic collusion is a significant factor, the demonstrated benefits of training may not fully generalize to situations outside of the joint learning environment. At the same time, this also serves as a reminder of the benefits of a widespread education in negotiation and conflict resolution. This is an area for further study.

Fourth, the popularity of the CRT as a research instrument might have the unfortunate effect of reducing the test’s validity as its items become widely known (Haigh, 2016; Thomson & Oppenheimer, 2016). However, the performance on the CRT seems to be stable over time and robust to multiple exposures. Stagnaro, Pennycook, and Rand (2018) identified 3,302
unique participants who had completed the CRT two or more times and found a strong correlation between their first and last CRT scores \((r = .81)\). Bialek and Pennycook (2018) found that multiple exposures do not invalidate the CRT. Finally, Meyer, Zhou, and Shane (2018) examined over 14,000 Mechanical Turk participants who took the test up to 25 times and found that prior exposure failed to improve scores; participants’ increase in score was a mere 0.024, and even that was chiefly driven by the minority who spent time reflecting on the questions. Finally, the later scores retain the predictive validity of earlier ones, as the initial success and subsequent improvement measure the same ability.

Overall, this study provides support to the idea that the capacity to resist impulsive intuitions and instead engage in effortful deliberation improves performance not only in heuristics and biases tasks, but also in negotiation. Taking a step back and thinking carefully increases gain. Haste indeed makes waste.

**Endnotes**

i There were no differences in negotiation outcomes and CRT scores between graduate and undergraduate groups. Gender also had no impact on the results. This is not discussed further.

ii Tables showing the impact of cognitive reflection on trained and untrained samples separately is in the Supplementary Information.

iii The SEM and mediation analysis of the indirect impact of CRT on integrative gain and compatible gain are in the Supplementary Information.
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Supplementary information

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Cognitive Reflection Test


A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?

_____ pennies

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

_____ minutes

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

_______ days
CRT in trained and untrained samples

Simple regressions of dyadic gains on dyadic CRT in trained and untrained groups

<table>
<thead>
<tr>
<th></th>
<th>Untrained sample</th>
<th>Trained sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Joint gain</td>
<td>Integrative gain</td>
</tr>
<tr>
<td>Dyadic CRT</td>
<td>431.13**</td>
<td>231.95**</td>
</tr>
<tr>
<td></td>
<td>(149.36)</td>
<td>(86.69)</td>
</tr>
<tr>
<td>Constant</td>
<td>7302.18</td>
<td>10220.71</td>
</tr>
<tr>
<td></td>
<td>(517.63)</td>
<td>(300.45)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.090</td>
<td>.079</td>
</tr>
</tbody>
</table>

* p<.05 ** p<.01 *** p<.001

Note. Variables are adjusted for no-deals. Standard errors in the regressions of compatible gain are based on the robust variance estimator.
### SEM and mediation analysis: Integrative gain

**Structural Equation Model**

<table>
<thead>
<tr>
<th>Integrative gain (adjusted)</th>
<th>Coef.</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>.95 CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyadic CRT</td>
<td>274.98</td>
<td>72.73</td>
<td>3.78</td>
<td>.000</td>
<td>132.44 - 417.53</td>
</tr>
<tr>
<td>Training</td>
<td>1315.51</td>
<td>289.07</td>
<td>4.55</td>
<td>.000</td>
<td>748.95 - 1882.07</td>
</tr>
<tr>
<td>Constant</td>
<td>10095.10</td>
<td>268.42</td>
<td>37.61</td>
<td>.000</td>
<td>9569.01 - 10621.20</td>
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</table>

<table>
<thead>
<tr>
<th>Dyadic CRT</th>
<th>Coef.</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>.95 CI</th>
</tr>
</thead>
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<tr>
<td>Training</td>
<td>0.97</td>
<td>0.34</td>
<td>2.88</td>
<td>.004</td>
<td>0.31 - 1.63</td>
</tr>
<tr>
<td>Constant</td>
<td>2.92</td>
<td>0.20</td>
<td>14.79</td>
<td>.000</td>
<td>2.53 - 3.31</td>
</tr>
</tbody>
</table>
SEM and mediation analysis: Compatible gain

Structural Equation Model

<table>
<thead>
<tr>
<th>Compatible gain (adjusted)</th>
<th>Coef.</th>
<th>Robust SE</th>
<th>z</th>
<th>p</th>
<th>95 CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyadic CRT</td>
<td>171.74</td>
<td>64.77</td>
<td>2.65</td>
<td>.008</td>
<td>44.80</td>
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