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The influence of group decision making on indecisiveness-related decisional confidence

Andrea L. Patalano* Zachary LeClair†

Abstract

Indecisiveness is an individual difference measure of chronic difficulty and delay in decision making. Indecisiveness is associated with low decisional confidence and distinct patterns of pre-choice information search behavior. The present study explored whether the confidence levels and search behaviors associated with individual indecisiveness also emerge in group decision making contexts. In this study, 97 decisive and indecisive participants were assigned to make a decision individually or in a homogenous three-person group. Indecisiveness score was found to predict participant decisional confidence in the individual condition but not in the group condition, with group participants being overall more confident than individuals. Similar results were obtained for other related measures of participants' perceptions of the decision task. Surprisingly, no indecisiveness-related differences in information search were found, suggesting that other aspects of the group process contribute to increased confidence. The results provide initial evidence that indecisiveness does not influence group decision making and that, especially for indecisive individuals, working in groups may be a way to boost decisional confidence.

Keywords: indecisiveness, group decision making, confidence.

1 Introduction

Indecisiveness is an individual difference measure associated with chronic difficulty and delay in decision making (Frost & Shows, 1993). Self-report descriptors include: taking a long time to decide, not knowing how to decide, feeling uncertain during decision making, avoiding decisions, changing ones mind, and regretting decisions (Germeijs & De Boeck, 2002). Given that the tendencies of indecisive individuals appear poorly adapted to many tasks (Mann, 1982), an important goal is to identify circumstances in which indecisiveness is likely to compromise effective decision making. The present research is motivated by the question of whether the relationship between indecisiveness and patterns of decision making in informational search contexts observed with individuals extends to groups. In the introduction, we first review past empirical work establishing a relationship between indecisiveness, decisional confidence, and informational search patterns. We then motivate our interest in exploring these relationships in a group decision making context, and integrate relevant group literature. Finally, we present an empirical study of the relationship between indecisiveness and patterns of decision making in individuals versus small groups.

1.1 Past indecisiveness research

Indecisiveness is generally considered a negative trait in that indecisive individuals expend greater resources despite little evidence of better outcomes (Ferrari & Dovidio, 2001).[1] They have greater difficulty making important life choices (Gati, Krausz, & Osipow, 1996; Gayton, Clavin, Clavin, & Broida, 1994), and report greater decisional worry and regret (Ferrari & Dovidio, 1991), negative health consequences (Ferrari, Johnson, & McCown, 1995; Frost & Shows, 1993) and lower life satisfaction (Rassin & Muris, 2005a). Indecisiveness is associated with personality correlates including perfectionism (especially components of doubting one's actions and concern for mistakes; Frost & Shows, 1993), and low self esteem (Effert & Ferrari, 1989). It is also associated with a maximizing tendency (especially components of information search and choice difficulty; Diab, Gillespie, & Highhouse, 2008; Schwartz, Ward, Monterosso, Lyubomirsky, White, & Lehman, 2002), defined as the desire to pursue the best choice rather than one that is

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[1] The terms *indecisive* and *decisive* are frequently used to describe individuals on either side of a median split on an indecisiveness measure, though it is conceptually more precise to use the terms *high indecisive* and *low indecisive.*

simply good enough.[2] Indecisiveness is not associated with perceptual discrimination or intelligence (Ferrari & Dovidio, 1997), suggesting differences in goals or tendencies rather than in basic cognitive abilities.

Indecisiveness is related to decisional confidence (Ferrari & Dovidio, 2001; Mirels, Greblo & Dean, 2002; Rassin, Muris, Franken, Smit, & Wong, 2007; Veinott, 2002), one's strength of belief about the quality of a choice on a continuum ranging from complete doubt or uncertainty to total certainty (Peterson & Pitz, 1988; Sniezek, 1992). Ferrari and Dovidio (2001) found that, even when all relevant information was available for viewing, indecisive individuals, relative to decisive ones, had lower confidence in their choice of a hypothetical college course, and Veinott (2002) extended the finding to the purchase of a used car and the choice of a financial aid applicant. In addition to being of psychological consequence to the decision maker, decisional confidence is an important measure in that it predicts the amount of information searched before choice commitment (Bohner, Rank, Reinhard, Einwiller, & Erb, 1998), and the likelihood of committing to a choice other than when under immediate pressure (Janis & Mann, 1977; Sniezek, 1992). And, it is related to realizing one's decision including degree of continuing choice commitment (Schwenk, 1986), successful choice implementation (Bolger, Pulford, & Colman, 2008; Petrocelli & Sherman, 2010; Zarnoth & Sniezek, 1997), and ability to persuade others to support a choice (Price & Stone, 2004; Sniezek & Van Swol, 2001).

Indecisiveness is also related to informational search. In informational search studies, typically an information board paradigm is used in which choice alternatives (e.g., Course A) and dimensions (e.g., Course Time) form row and column labels of a grid and units of information in grid cells are initially hidden from view. Participants reveal cell information (e.g., "desirable time") before making a choice, and information search paths are recorded. In situations similar to the present study, indecisiveness has been associated with taking more time to decide (Ferrari & Dovidio, 2000; Rassin, Muris, Booster, & Kolsloot, 2008; but see Ferrari & Dovidio, 2001; Patalano & Wengrovitz, 2007), gathering more information overall, gathering more information about the eventually selected alternative, and gathering more information about the eventually selected alternative as a percentage of all information selected, the latter called "tunnel vision" (Ferrari & Dovidio, 2000; Rassin et al., 2008). Indecisiveness has also been associated with greater use of *dimension-based* search[3] (Ferrari & Dovidio, 2000; Patalano, Juhasz, & Dicke, 2010), comparing alternatives on a dimension before moving to another dimension, relative to *alternative-based* search, looking at an alternative on multiple dimensions before moving on to another alternative. The one exception is that, in one study, indecisive individuals initially used more alternative-based search, possibly in an to attempt to identify an ideal alternative, before moving to dimension-based search, all relative to decisive individuals who used a consistent strategy (Patalano et al., 2010).

In more complex decision situations, additional decision-related differences have emerged. While these situations go beyond the present study, the findings further support the link between indecisiveness and decision making behavior. Indecisive individuals have been shown to devote greater working memory resources to informational search, as evidenced by greater interference from a secondary working memory task (Ferrari & Dovidio, 2001). They are more distracted during search, frequently looking away from information cells in an eye tracking study (Patalano et al., 2010). They are poorer at weighing the benefits versus costs of delaying choice to obtain additional alternatives, resulting in less adaptive behavior (Patalano & Wengrovitz, 2007). And, they show greater depletion of self-regulatory resources in situations in which performance accuracy must be self-monitored. Specifically, after performing a Stroop task without feedback, indecisive individuals drank less of a poor-tasting drink for money (Ferrari & Pychyl, 2007). In sum, across both basic and more complex task situations, indecisive and decision individuals appear to engage differently in the process of gathering information towards making a decision.

While it is not yet clear how to integrate all of these findings, a high need for certainty among indecisive individuals (Rassin & Muris, 2005a, 2005b; Rassin, et al., 2007)—possibly related to low self esteem and perfectionism—is likely to play a central role, and a number of studies have demonstrated a relationship between indecisiveness and need for certainty. For example, in drawing straws from an opaque container towards assessing whether the majority of straws were red or blue, indecisive individuals drew more straws before making a response (Rassin et al., 2007). In responding to ambiguous hypothetical diary statements (e.g., "I phoned the doctor today and was surprised to hear the results of last week's checkup"), indecisive individuals interpreted statements with greater cause for concern (Rassin & Muris, 2005b). And, in a task involving choosing between strong value-based alternatives (e.g., "Suicide is never a rational option") and an "I don't know" choice, indecisive individuals gave more "I don't know" responses (Rassin & Muris,

[2]Diab et al. argued that only the subscale that is a proper measure of maximization is the one associated with having high standards, in other words the one *not* correlated with indecisiveness. We do not address this important conceptual issue here.

[3]The terms *intradimensional* and *interdimensional* search are sometimes used instead of dimension-based search and alternative-based search respectively.

2005a). What might underlie the information search strategies used by indecisive individuals is the desire to increase choice certainty.

1.2 Present research

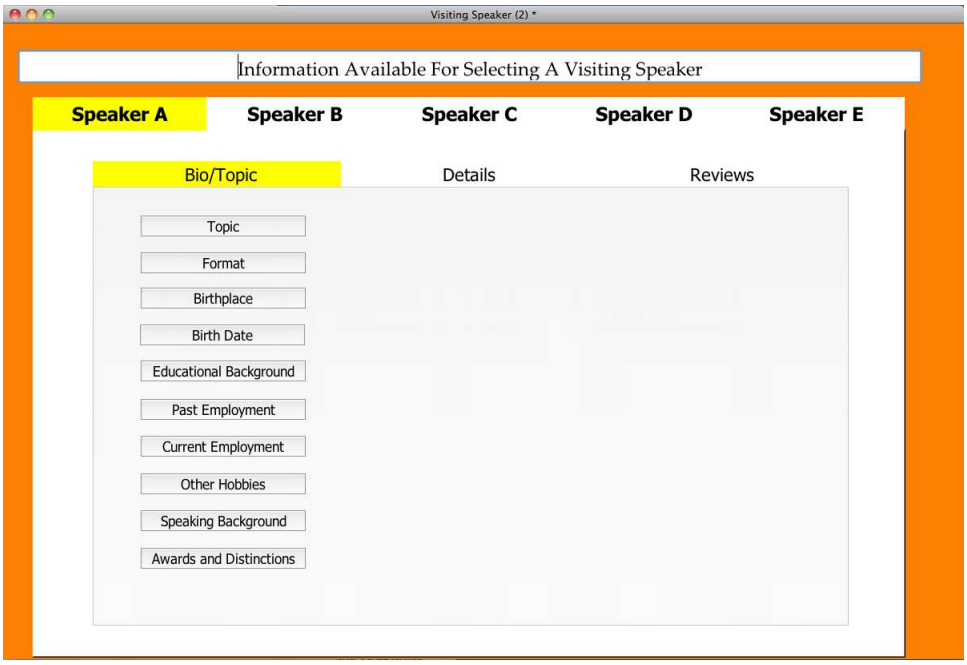
The present work is motivated by the question of whether the negative relationship between indecisiveness and confidence, as well as related informational search behaviors, observed in individual decision making extends to group decision making contexts. Do members of groups composed of indecisive individuals also feel less confident in their group's decisions than do members of groups composed of more decisive individuals, and is this difference accompanied by corresponding differences in search behavior? The study of groups is important in that many decisions are made by groups: faculty in an academic department might select a job candidate to hire, a committee of company executives might develop a plan for promoting a new product, and a community board might decide how to allocate usage of the town green. We are interested in whether the perceptions and behaviors associated with individual indecisiveness arise during group decision making and are reflected in members' confidence in their group decisions and their associated group search behavior. Only a little work has examined individual difference characteristics of members as they contribute to understanding the collective behavior of a group and group members' perceptions of that behavior (Armstrong & Priola, 2001; De Grada, Kruglanski, Mannetti, & Pierro, 1999; LePine, Hollenbeck, Ilgen, & Hedlund, 1997) and no work has examined individual indecisiveness and group processes, to our knowledge.

One possibility is that indecisiveness is compounded at the group level as individuals jointly promote and escalate perceptions and process behaviors associated with indecisiveness. This possibility is consistent with work finding that individuals with low self esteem—a strong correlate of indecisiveness—make poorer decisions in groups than do those with higher self-esteem (Brockner & Hess, 1986; Schwartz, Wullwick, & Shapiro, 1980), as well as with other manifestations of individual differences at the group level (e.g., need for closure; De Grada et al., 1999). However, group decision making has also been well-documented as generally leading to increases in decisional confidence in both intellective tasks (i.e., where there is a correct response; Puncochar & Fox, 2004; Sniezek & Henry, 1989; Sneizek, 1992) and judgment tasks (Ono & Davis, 1988; Stephenson, Clark, & Wade, 1986). To the extent that group confidence extends to indecisive individuals, it might "undermine" decisional tendencies driven by low confidence, reducing indecisiveness-related behaviors in the group context. Yet another possibility is that, because indecisive individuals tend to delay choice commitment, they might benefit to a greater extent from group discussion, and might more easily integrate diverse perspectives into an ultimate rationale for a choice, with corresponding increased confidence.

In the present study, the decision making of indecisive versus decisive individuals working alone versus in homogenous three-person groups (similar to Schwartz et al., 1980) was examined during a decision task of selecting a fictional speaker to deliver a campus talk. Homogenous groups were used because they provide the most straightforward test of a relationship between indecisiveness and group decision making. On a computer display, participants were able to view as much information as they desired about each speaker before making a choice. The task was similar to past information board studies except that more information was available to reduce systematic selection of all information; information was not displayed on a grid but rather over multiple screens (typical of web-based information search; see Figure 1); and the new decision scenario allows us to generalize findings beyond the course scenario used in past studies. After finishing the task, participants answered a set of questions about the decision task and completed additional individual difference measures.

Dependent measures included post-task questions and behavioral process variables. Post-task questions assessed confidence in one's (or the group's) decision, perceptions of the decision task (e.g., satisfaction with the process) and motivational goals during decision making (e.g., getting the correct answer). Questions regarding perceptions of the decision task were included to corroborate any confidence findings in that cues used to assess decision confidence might also influence judgments of decision process and difficulty. The motivational goals question assessed whether a desire to get a correct answer rather than to have a productive process might drive decision making by indecisive individuals to a greater extent that others. Behavioral process variables (as in Rassin et al., 2008) were task time, number of information cells viewed, number of revisits to previously viewed cells, percentage of chosen-alternative cells viewed, percentage of non-chosen-alternatives cells viewed, percentage of dimension-based search shifts as a function of all alternative and dimension-based shifts, and a tunnel vision measure computed as the number of cells viewed about the eventual choice as a function of all cells viewed. Individual difference measures were also included to replicate and possibly extend correlates of indecisiveness. In addition to self esteem, perfectionism, and maximization, we included five basic dimensions of personality, namely, neuroticism, extroversion, openness to new experience, conscientiousness, and agreeableness (Five Factor Model; John & Srivastava, 1999), which might suggest

Figure 1: The visual display for the speaker-selection decision making task. The button label is replaced with "We Have Made a Decision" in the group condition.



differences in member effectiveness in group settings.

2 Method

2.1 Participants

One hundred twenty-five college undergraduates completed an online prescreening battery that included Frost and Shows' (1993) 15-item Indecisiveness Scale (see Appendix A) with responses elicited on a scale from 1 (Strongly disagree) to 9 (Strongly agree). A median split (Mdn = 4.01) on individuals' scores was used to categorize participants as decisive versus indecisive for condition assignment. From the prescreened group, 97 volunteered to participate in the study in exchange for either Introductory Psychology course credit or monetary compensation and performed the task 2–6 weeks later. Each participant was quasi-randomly assigned to a grouping condition: completing the task individually versus participating in a homogenous group of three people. There were 17 indecisive (13 female; scale M = 4.96, SD = .76) and 23 decisive participants (11 female; scale M = 2.80, SD = .92) in the individual condition, and 27 indecisive (9 groups, 18 female individuals; scale M = 4.93, SD = .58), and 30 decisive participants (10 groups, 12 female individuals; scale M = 2.78, SD = .63) in the group condition. Individuals and groups were run in the lab one at a time.

2.2 Decision materials

Information profiles were created for five potential campus speakers. Twenty-eight unit of information about each speaker were divided nearly equally over three dimensions: *Bio/Topic* about the speaker's background and interests (e.g., "University affiliation"); *Details* about the speaker's talk requirements (e.g. "Available dates"); and *Reviews* by peers and students (e.g. "Peer review 1"). A unit of information could be viewed by using a computer mouse to click on a speaker name, then a category label, and then an information label. For example, clicking on Speaker A → Bio/Topic → University affiliation would display "Is currently a professor at Harvard University" (see Figure 1). The information remained on the screen until a new click was made. All speakers had pros (e.g., inexpensive speaking fee) and cons (e.g., lecture topic of limited appeal) so that, if each unit of information were weighed equally, speakers would be approximately equally attractive, thus making the decision task challenging.

2.3 Post-task questionnaire

The post-task questionnaire had three parts. First, participants were asked which speaker they (or their group) chose and their confidence in their (or their group's) decision on a 7-point scale (1 = Not at all confident, 7 = Ex-

tremely confident).[4] Second, they rated their agreement with a set of task-related statements (1 = Very strong disagreement, 7 = Very strong agreement): (a) "I am satisfied with my [my group's] decision making process" (*Process satisfaction*), (b) "Choosing what information to look at was stressful" (*Search stress*), (c) "I feel that I [my group] spent enough time considering all of the options" (*Time sufficiency*), (d) "I had difficulty personally deciding who the best speaker was" (*Personal difficulty*), and (e) "Picking the best speaker would be a difficult task for anyone" (*Universal difficulty*). The first three items considered decision process, while the latter two asked about decision difficulty. Third, participants ranked three goal statements in order of importance: getting the "correct" answer, working in a productive fashion, and completing the task quickly. The first two goals were included because indecisive individuals might be more likely to conceptualize the decision task as one of finding a correct answer rather using an effective process, and this might drive other differences; the last goal might suggest lack of engagement in the present task.

2.4 Individual difference measures

A number of individual difference measures were administered. Previously reported correlates of indecisiveness were the 35-item Frost Multidimensional Perfectionism Scale (especially subscales of Concern for Mistakes and Doubting of Actions; Frost, Marten, Lahart & Rosenblate, 1990), the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965), and the 13-item Maximization Scale (especially the subscales of Alternative Search and Decision Difficulty; Nenkov, Morrin, Ward, Schwartz, & Hulland, 2008). In addition, we included the 44-item short version of the Five Factor Inventory (John & Srivastava, 1999) with subscales for Neuroticism, Extroversion, Openness to New Experience, Agreeableness, and Conscientiousness. Responses were collected on a 7-point scale (1 = Strongly disagree to 7 = Strongly agree). Testing whether there is a relationship between indecisiveness and basic personality dimensions is valuable in its own right. We also considered that extroversion and agreeableness might have bearing on the effectiveness of member decision making in novel groups.

2.5 Procedure

Either one or a group of three participants sat at a large computer projector screen with a single computer mouse. They were told to imagine that they were charged by the president with choosing a speaker to bring to campus for an important university-wide lecture, and that they could examine as much information as they wished about the five candidate speakers displayed on the screen before making a choice. In the group condition, participants were further instructed they needed to approach the task as a team, from selecting which individual pieces of information to view to arriving at a unanimous final decision. After orienting participants to the computer display, the experimenter left the room and allowed the participants to begin. Once a decision had been reached, participants clicked a button to indicate task completion and were then instructed to turn to individual post-task booklets, which contained the post-task questionnaire followed by individual difference measures, placed in nearby cubicles. The study took approximately 40 min. In addition to the computer recording all button presses made by the participants, a video camera recorded audio-visual data, the latter collected largely to check for active participation by all members in the group condition.

3 Results

A review of the videos confirmed that the task was generally performed as expected. Group members spoke approximately equally and divided control of the mouse, and there were no apparent gender differences in behavior. Discussion was present throughout the task and was largely devoted to planning the next piece of information to view and stating opinions about the alternative being viewed. This continued until a consensus emerged from the group and a choice was made. There were no differences in the choice made as a function of grouping condition or indecisiveness category. The percentage of participants choosing each possible visiting speaker as their preferred alternative was: Speaker A (chosen by 29%), Speaker B (46%), Speaker C (1%), Speaker D (6%), and Speaker E (18%).

3.1 Confidence post-task variable

Descriptive statistics are shown in Table 1.[5] Group members gave independent responses, so a case was the individual even for the group condition. Linear regression was used to analyze the relationship between grouping condition (coded as individual = -1 and group = 1), indecisiveness score (recoded as deviation from the mean of all participants), the interaction, and outcome measures (for all analyses unless otherwise noted). For the confidence outcome measure, grouping condition (b = .16,

[4]Group members were also asked what choice they would have made individually; all chose the group response with the exception of 2 indecisive group members. Results would not change if these individuals were excluded from analyses.

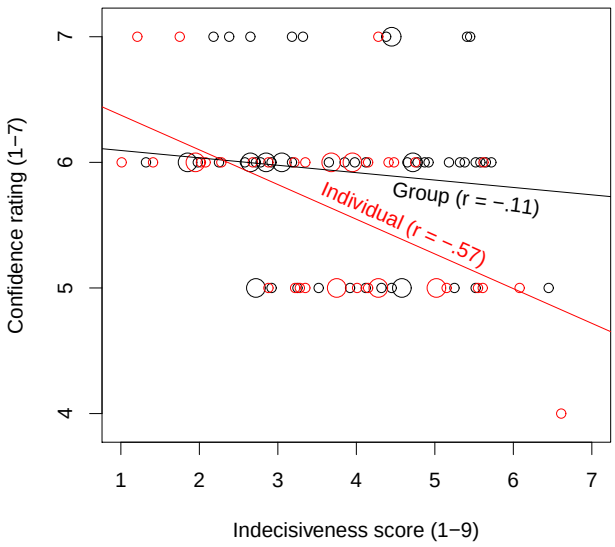
[5]Occasionally, a participant failed to respond to a response item. There were no systematic missing responses and no more than a one participant failed to respond to each measure.

Table 1: Confidence and post-task item responses by grouping condition and indecisiveness category.

	Individual (n = 40)		Group (n = 57 individuals)	
	Indecisive	Decisive	Indecisive	Decisive
Choice confidence[1]	5.4 (.17)	5.8 (.12)	5.9 (.13)	6.0 (.11)
Process satisfaction[2]	5.1 (.31)	5.9 (.15)	6.2 (.18)	5.9 (.22)
Search stress[2]	3.6 (.40)	2.7 (.32)	2.4 (.27)	2.2 (.26)
Time sufficiency[2]	4.5 (.39)	5.3 (.24)	5.5 (.22)	5.3 (.30)
Personal difficulty[3]	3.8 (.39)	3.6 (.31)	3.3 (.30)	3.1 (.30)
Universal difficulty[3]	5.0 (.42)	4.7 (.39)	4.7 (.34)	4.5 (.29)

Notes: SE's in parentheses.
[1]Grouping condition, indecisiveness score, and interaction were reliable predictors (p's < .05).
[2]Process Perception; all three predictors were reliable (p's < .01).
[3]Difficulty Perception; only indecisiveness score was reliable predictor (p < .05).

Figure 2: Relationship between indecisiveness score and confidence rating for individual (red) versus group (black) decision making conditions. A higher number on the x axis reflects greater indecisiveness. Circle sizes are larger for two points (participants) in the same place. Best fitting regression lines are shown.



t = 2.50, p = .013), indecisiveness score (b = −.17, t = −3.43, p = .001), and the interaction (b = .11, t = 2.23, p = .028) were reliable predictors (full model: F(3, 93) = 7.14, p < .001). Further analyses revealed that indecisiveness score was negatively correlated with confidence in the individual condition (r = −.57, p < .001), but not the group condition (r = −.11, p = .400; see Figure 2). In other words, only for individuals was an increase in indecisiveness associated with a decrease in confidence (Fisher's z = −2.52, p = .012, for difference between correlations), and groups were generally more confident overall. These findings suggest that indecisiveness is not manifested at the group level: Working alone, indecisive individuals were less confident in their decisions than were more decisive individuals; working in groups, they were equally highly confident.

3.2 Task-related questions

Descriptive statistics for the five task-related questions are shown in Table 1. A principal components analysis revealed that responses to the questions loaded on two factors accounting for 69% of the variance (see Appendix B for full analysis). A composite score was created for each factor by averaging items loading on the factor, resulting in two measures called Process Perception (Questions a, b, c, the first and third reverse coded) and Difficulty Perception (Questions d, e).[6] For Process Perception, mirroring the confidence findings, grouping condition (b = −.29, t = −2.93, p = .004), indecisiveness score (b = .22, t = 2.92, p = .004), and the interaction (b = −.23, t = −3.02, p = .003) were reliable predictors (F(3, 93) = 8.10, p < .001). As before, indecisiveness scores and responses were related in the individual condition (r = .58, p < .001) but not in the group condition (r = −.10, p > .939; Fisher's z = 3.57, p < .001, for difference between correlations). For Difficulty Perception, only indecisiveness score (b = .25, t = 2.22, p = .029) was a reliable predictor (other p's > .200; F(3, 93) = 4.59, p < .035 for reduced model; r = .21 across conditions). In other words, indecisive individuals had more negative perceptions of both the process and the difficulty of the task.

[6]The pattern of results is unchanged if regression analyses are conducted on individual questions.

Table 2: Post-task dominant goal by grouping condition and indecisiveness category.

	Individual (n = 40)		Group (n = 57 individuals)	
	Indecisive	Decisive	Indecisive	Decisive
Answer correctly	11 (65)	13 (57)	7 (28)	9 (32)
Work productively	5 (29)	9 (39)	18 (72)	17 (61)
Minimize time	1 (6)	1 (4)	0 (0)	2 (7)

Notes: Percentages in parentheses. Only grouping condition was reliable predictor ($p < .01$).

Table 3: Process results by grouping condition and indecisiveness category.

	Individual (n = 40)		Group (n = 57 individuals)	
	Indecisive	Decisive	Indecisive	Decisive
Time (min)[1]	13 (1.3)	12 (1.0)	17 (1.9)	20 (2.5)
Information selected (0–140 units)	93 (8.1)	91 (6.9)	78 (8.8)	80 (8.2)
Checks (0-∞ units)	34 (4.9)	28 (4.4)	30 (6.3)	35 (9.5)
Selected course (% of 28 units)	71 (6.0)	76 (4.4)	80 (6.7)	76 (6.6)
Non-selected courses (% of 112 units)	65 (6.4)	62 (5.3)	50 (6.8)	53 (6.1)
Dimension-based search (%)	21 (5.1)	21 (4.2)	19 (3.9)	26 (6.1)
Tunnel vision (% of selected)[1]	22 (1.9)	25 (1.5)	30 (2.0)	27 (1.7)

Notes: *SE*'s in parentheses.
[1]Only grouping condition was reliable predictor (p's < .05).

For the process measure, the relationship was strong for individuals working alone but not present for individuals working in groups. For the difficulty measure, the relationship was overall less strong but was not reliably different for individuals working alone versus in groups. In part, these findings provide further evidence that indecisiveness is not manifested at the group level in that indecisive individuals working in groups no longer had negative perceptions of the decision process. However, interestingly, the perception that the task was more difficult for indecisive participants remained even in the group condition. Working in a group might provide cues that alter one's perception of the decision process, while not fundamentally changing perception of decision difficulty.

3.3 Goal ranking post-task variable

Participants rank-ordered three goal-related statements: getting the correct answer, working productively, and completing the task quickly. The first choice of each individual is shown in Table 2. Only 4 participants chose completing the task quickly as either a first or second ranked variable, so a table of second-choice results would be nearly a reverse of the first two columns. A binary logistic regression analysis was conducted with dominant goal (getting correct answer vs. working productively) as the response, excluding the 4 participants who chose completing the task quickly. Grouping condition was a reliable predictor of goal choice (*Wald* = 8.41, *SE* = .45, p = .004), but not indecisiveness score (*Wald* = 0.49, *SE* = .25, p = .486), or the interaction (*Wald* = 0.11, *SE* = .35, p = .739; for full model: $\chi^2(3, N = 89) = 9.55$, p = .023). In other words, for both indecisive and decisive individuals, when working alone, obtaining the correct answer was most often the primary goal while, when working in a group, this goal was often surpassed by a desire to work productively. These findings suggest that getting the correct response is not of greater general concern to more indecisive individuals, nor does the task goal change to a greater extent for indecisive individuals in the group setting.

3.4 Behavioral process variables

Descriptive statistics are shown in Table 3. Because all members of a group shared process performance, a case was a group, not an individual, for these variables (resulting in $N = 57$ for all analyses). Linear regression was con-

ducted as before except that, for groups, indecisiveness score was replaced with the average score of members. Grouping condition influenced behavior in that groups took longer to do the task (18 vs. 13 min; b =2.8, t = 3.52, p = .001), looked at less information about non-choice alternatives (51% vs. 63%; b = −6.0, t = −1.82, p = .075, m.s.) and showed greater tunnel vision (28% vs. 24%; b = 2.2, t = 2.30, p = .025), the latter from looking at less information about non-choice alternatives rather than more about the choice alternative. Indecisiveness score was not related to process variables either alone or through interaction with grouping condition (p's > .200). The results suggest that individuals and groups searched information similarly but that groups allocated efforts somewhat differently, spending relatively less time considering non-selected alternatives. Interestingly, groups in some ways behaved like "typical" indecisive individuals, spending more time and looking at more choice relative to non-choice information. The results were surprising in the individual condition in that indecisiveness-related differences seen in past work were not observed.

A coder blind to condition assignments also coded the videos for time to first proposal of a preference, time to first proposal of eventually chosen preference, and time to first elimination of an alternative to assess whether any process differences existed that might have been missed with standard measures. No indecisiveness-related differences were observed (p's > .100). The coder also listed the articulated choice strategies for each group video (e.g., a weighted linear rule, elimination by aspects, etc.), for which no discernable differences in choice strategy were observed. The videos were, in sum, fully consistent with the process data.

3.5 Individual difference measures

An average score was computed on each scale for each participant after reverse coding of items as appropriate. As shown in Table 4, indecisiveness was correlated with self esteem, with the two subscales of maximization previously associated with indecisiveness (third subscale p > .100), and with one of the two subscales of perfectionism previously associated with indecisiveness (remaining five subscales p's > .100). The only failure to replicate past findings was with the Doubting of Actions subscale of perfectionism. In regard to the Five Factor Inventory, indecisiveness was correlated positively with neuroticism, and negatively with extraversion and conscientiousness. The extraversion finding suggests that indecisive individuals might be less comfortable expressing themselves in unfamiliar groups, though this was not apparent in other findings.

Table 4: Correlations between Indecisiveness Scale and other individual difference measures.

Scale	r	p
Self Esteem	+.47	***
Alternative search[1]	+.28	**
Decision difficulty[1]	+.40	***
Doubting of actions[2]	+.12	
Concern for mistakes[2]	+.54	***
Neuroticism[3]	+.45	***
Extraversion[3]	−.22	*
Openness[3]	+.07	
Agreeableness[3]	−.20	†
Conscientiousness[3]	−.46	***

Notes: N = 97. [1]Maximization subscale. [2]Multidimensional Perfectionism subscale. [3]Big Five Personality Inventory subscale. ***p < .001; *p < .05; †p < .10.

4 Discussion

To summarize, first, indecisiveness was negatively related to post-decisional confidence for individuals working alone, with indecisiveness accounting for 32% of the variance in confidence ratings, but this relationship did *not* extend to individuals making decisions in groups, with group members overall more confident in their decisions. Second, the latter interaction is corroborated by participants' reflections on the decision process including satisfaction with the process, stressfulness of search for information, and sufficiency of the time devoted to search; in contrast, for perceived task difficulty for self or others, the relationship with indecisiveness was not modulated by whether one worked alone or in a group. Third, individuals working alone more often ranked being correct as their dominant goal, while those working in groups more often ranked working productively as dominant. Fourth, indecisive and decisive individuals showed similar performance to one another in both conditions, with groups spending more time in deliberation, looking at less information about the non-selected alternative, and having greater tunnel vision measured as the percentage of information selected about the choice as a function of all selected information. And, fifth, indecisiveness correlations with low self esteem and subscales of perfectionism and maximization were largely replicated, and those with neuroticism, low extroversion, and low conscientiousness were established.

How does working in a group influence the perceptions of the decision task for indecisive versus decisive individ-

uals? The confidence findings address this question, providing evidence that the confidence-related differences seen here and in past work (e.g., Ferrari & Dovidio, 2001) at the individual level, do not emerge at the group level. Rather, individuals working in groups were, on average, about as confident in their choices as the most highly decisive individuals working alone. Group decision making appears to have the effect of increasing the confidence of indecisive individuals, even when the group is composed solely of such individuals, while having minimal effects on the already high confidence levels of the most decisive individuals. This pattern extends beyond confidence *per se* to also include the decision maker's perception of the decision process but not perception of decision difficulty. While there is the possibility of ceiling effects limiting the ability of decisive group members to have given an even higher confidence rating, the fact that the highest possible confidence rating (a "7") was used only 13% of the time suggests that participants recognized, but chose not to use, this option. Additionally, the ratings for the process-related questions followed a similar interaction pattern and, for some questions, means were more than two points from either end of the scale.

How might group collaboration have contributed to increased confidence? Various explanations have been proposed to account for confidence in group decision contexts in general. One explanation is that interaction allows members to collect additional information in support of their initial views thereby increasing confidence in these views (Vinokur & Burnstein, 1974), Another is that social interaction—not information collection—increases the discussion of shared knowledge (Sniezek & Henry, 1989) and motivates members to articulate more coherent arguments to explain their views, which in turn increases confidence (Heath & Gonzalez, 1995). It has also been proposed that group tasks can diffuse individual accountability (Buehler, Messervey, & Griffin, 2005), and that the time and effort required for group decision making, as well as the mere act of reaching consensus, can serve as cues to confidence (Sniezek, 1992). The present findings, in which groups looked at less information about non-chosen alternatives, suggest that group members did not gain confidence from information, but that confidence could have come from other proposed sources. It is particularly interesting that groups showed some of the same behaviors characteristic of indecisive individuals in past studies: taking more time and devoting proportionately more attention to the eventually selected choice. These behaviors might increase confidence by focusing discussion on the strengths of the eventually selected choice and decreasing attention to ways in which it falls short of other options.

What remains unclear is why these features of group decision making might have a greater impact on indecisive individuals than on more decisive individuals. Even the "dominant goal" findings here showed most individuals—not just indecisive ones—had different goals in the two conditions, ruling this out as an obvious explanation. One possibility is that all group decision makers are exposed to similar potential influences on confidence but that indecisive individuals respond differently to them than do more decisive individuals. Decisive individuals might focus on internal cues to confidence while indecisive individuals, used to chronically low internal perceptions of confidence, might be more motivated to seek external cues. A second possibility is that reorienting one's dominant goal in the group situation might have a greater impact on the confidence of indecisive individuals. Indecisive individuals have already been shown to desire greater certainty in their choices before committing to them, so a focus on choice correctness might place greater burdens on these individuals. A third possibility is that, for indecisive individuals, internal cues to confidence might typically be suppressed or overridden by a strong sense of concern for how a choice will reflect on these individuals (Ferrari & Dovidio, 2001). Some group-related release from personal accountability might allow indecisive individuals to more realistically evaluate their decision process and choice. Finally, a fourth possibility is that, because indecisive individuals are less committed to choice options early in the decision process, they might be better able to utilize the diverse viewpoints afforded by the group process and to value and enjoy the process more (despite being somewhat less extroverted), and this might be reflected in confidence. Relatedly, they might have more experience or familiarity with group decision making and find it a more natural way to make decisions.

The work provides initial evidence that individual indecisiveness might *not* be a critical factor in the composition of decision making groups, in that perceptions and behaviors of even the most indecisive individuals do not appear to extend to group participation. In fact, working in groups—or possibly just seeking advice and consultation of others prior to decision making—might serve as a beneficial decision "aid" for more indecisive individuals (see Sniezek & Buckley, 1995, for examples). The only known past work that explored decision aids for more indecisive individuals involved the use of structured information grids and instructions to assess the value to the decision maker of cell information (Veinott, 2002). With this approach, indecisive and decisive individuals took the same time to commit to a decision as when provided unstructured information, and low confidence for indecisive individuals remained unchanged. It might be that it is more effective to aid indecisive individuals in increasing confidence early in decision making—thereby discouraging such individuals from engaging in counterproduc-

tive search strategies—rather than by directly prescribing strategies. More indecisive individuals might also naturally gravitate towards group decision contexts and get more pleasure and satisfaction from such contexts, as previously suggested.

While the low decisional confidence of very indecisive individuals can be problematic, it is also the case that both individuals and groups can be *overconfident* in their decisions—showing greater confidence in the accuracy of a decision than is warranted by the number of times the group is correct in objective contexts (e.g., Fischhoff, Slovic, & Lichtenstein, 1977). There is little research on indecisiveness when objectively correct decisions exist, so the relationship between confidence and accuracy for more versus less indecisive individuals is not known. One might imagine that indecisive individuals would be less susceptible to overconfidence than more decisive individuals in both individual and group decision making contexts. However, the present work offers no evidence that individual differences related to low decisional confidence, and any group-related cues that promote higher confidence, have additive effects. Rather, group-related cues appeared to take precedence over individual-difference contributors to confidence, and thus could continue to lead to overconfidence in group situations. In sum, while the group decision process appears to elevate the low confidence of more indecisive individuals, indecisiveness does not appear likely to dampen the too high confidence that can come from working in a group. The present work did not consider heterogeneous groups, and future work might also consider the extent to which an indecisive individual is more likely to alter his or her values and preferences position in the context of more confident others, as well as other influences of indecisiveness on intergroup dynamics.

One thing that was surprising about the present findings was that indecisiveness at the individual level was not associated with any differences in process behavior, failing to replicate some past work (e.g., Ferrari & Dovidio, 2000, 2001; Rassin et al., 2008). There were some differences between the present task and past studies including that the speaker selection scenario here might have been of less personal relevance, familiarity, and possibly emotional significance than the course selection task used in the past; and that the display presentation and larger amount of information available here might have made tradeoff conflict less salient. However, given that one reason for providing more information was to magnify search differences, the results were surprising. Importantly, they do suggest that rather than the informational search strategies used by indecisive individuals being a proximal cause of low confidence, a desire to reduce choice uncertainty might give rise both to confidence differences and, in some cases, to search-based attempts to increase certainty. Furthermore, there might be a variety of strategies used to try to reduce uncertainty—choice delay, search for an ideal alternative, focus on few dimensions to reduce tradeoffs, etc.—and so replication of particular strategies might depend more highly on situational details than previously considered. The findings, in conjunction with other failures to replicate various aspects of search strategy (e.g., Patalano & Wengrovitz, 2007; Rassin et al., 2008) are an important caution that greater understanding is needed of the conditions under which strategy differences emerge. In future work, it would be valuable to try to replicate the present group findings in a situation in which indecisiveness-related process differences are present for individuals.

In sum, the present work furthers an understanding of the nature of indecisiveness and the situations in which perceptions and behaviors associated with indecisiveness are—and are not—likely to emerge. The study offers evidence, first, that indecisiveness-related differences in perceptions and process behaviors at the individual level do not emerge in group decisions; second, that indecisiveness-related differences in confidence are not necessarily a direct function of process differences, an important insight for the development of models of indecisiveness (see Rassin, 2007); and third, that indecisive individuals might be aided in their decision making through activities that foster decision-related social interaction. Indecisiveness is one of very many factors now known to contribute to the subjective experience of decisional confidence (see, e.g., Russo & Schoemaker, 1992). Areas for future research are: 1., understanding how individual difference contributors interact with other cues in contributing to decision-related perceptions, and, 2., developing a better understanding of how low decisional confidence and specific motivational goals might contribute to process differences.

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Appendix A: Frost & Shows' (1993) 15-item Indecisiveness Scale

Responses are most typically collected on a Scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) and one's score is computed as a sum of all responses after reverse scoring of responses to Items 2, 3, 5, 6, 8, and 9. A 1 - 9 scale and a mean score were used here for consistency with other prescreening measures.

1. I try to put off making decisions.

2 I always know exactly what I want.

3. I find it easy to make decisions.

4. I have a hard time planning my free time.

5. I like to be in a position to make decisions.

6. Once I make a decision, I feel fairly confident that it is a good one.

7. When ordering from a menu, I usually find it difficult to decide what to get.

8. I usually make decisions quickly.

9. Once I make a decision, I stop worrying about it.

10. I become anxious when making a decision.

11. I often worry about making the wrong choice.

12. After I have chosen something, I often believe I have made the wrong choice.

13. I do not get assignments done on time because I cannot decide what to do first.

14. I have trouble completing assignments because I cannot decide what is most important.

15. It seems that deciding on the most trivial things takes me a long time.

Appendix B: Factor analysis for five decision task questions

A principal components analysis was conducted after reverse coding of Questions a and c. A factor solution was identified with two factors (all eigen values > 1) accounting for 45% and 24% of the total variance respectively. (The next proposed factor had an eigen value of .72, accounted for 13% of the variance, and was at the leveling off point of the scree plot.) The two factors are meaningful in that questions regarding participant perceptions of the decision process loaded on the first factor (labeled Process Perception), while those regarding perceptions of decision difficulty loaded on the second factor (called Difficulty Perception).

Factor loadings (with varimax rotation) are shown below:

	Process perception	Difficulty perception
(a) Process satisfaction	.81	.13
(b) Search stress	.76	.16
(c) Time sufficiency	.78	.06
(d) Personal difficulty	.14	.87
(e) Universal difficulty	.12	.87

Note that all items had primary loadings above .75 and all had cross loadings below .20. Internal consistency of each factor was examined using Cronbach's alpha. The alphas were moderate: .69 for Process Perception and .72 for Difficulty Perception.