Exploring enablers and inhibitors of productive peer argumentation: The role of individual achievement goals and of gender

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Abstract

Argumentation has been recognized as an important classroom activity and as a potentially powerful means for learning complex academic content. However, eliciting and sustaining student-to-student argumentive discourse that is both critical as well as constructive is also known to be notoriously difficult. Whereas previous research has traditionally focused on the cognitive, meta-cognitive and task-related antecedents and conditions for productive student argumentation, in the present work we explore two social-motivational factors that may provide insight into this difficulty, namely students' individual achievement goals and gender. In two separate studies, undergraduate students indicated their intentions to engage in different discourse types when asked to discuss their solutions to a complex topic from astronomy (N = 245, Study 1) or economics (N = 98, Study 2) with a disagreeing peer. In addition to the productive, ideal type of argumentive discourse for learning purposes (i.e., deliberative argumentation), three additional discourse types were targeted that typically ensue, but are considered less productive (i.e., disputative argumentation, quick consensus seeking and private deliberation). The overall pattern of results show that mastery goals (a focus on developing competence and task mastery) are associated with deliberative argumentation and with private deliberation. In contrast, performance-approach goals (a focus on demonstrating competence relative to others) as well as high confidence are associated with disputative peer argumentation. Quick consensus seeking was predicted by higher performance-avoidance goals (a focus on avoiding incompetence relative to others) and lower mastery goals. No consistent gender differences were found. Taken together, the results extend previous work in socio-cognitive conflict settings and emphasize the role of achievement goals in peer argumentation.

Argumentation has become a central focus of educational research and curriculum innovations. It has been recognized as a main tenet of authentic inquiry in science, mathematics and history classrooms (e.g., Driver, Newton, Osborne, 2000; Osborne, 2010; Schwarz, Hershkowitz & Prusak, 2010), as a means to hone students' critical thinking and reasoning skills (e.g., Anderson, Howe, Soden, Halliday & Low, 2001; Kuhn, 1991; Kuhn & Crowell, 2011), and as a means to promote learning, and in particular conceptual understanding of scientific concepts for which students have notoriously robust misconceptions (e.g., Asterhan & Schwarz, 2007, 2009; Asterhan & Babichenko, 2015; Chin & Osborne, 2009; Nussbaum & Sinatra, 2003; Schwarz, Neuman & Biezuner, 2000).

However, research also shows that even high school and college students often perform below-par on argumentation tasks and that argumentive peer discussions are notoriously difficult to elicit. Even after repeated and extensive exercise, and especially on scientific topics, only a subset of student dialogues will show genuine argumentation in which they consider and compare at least two alternatives (or two sides of an issue) through reasoning (e.g., Asterhan & Schwarz, 2007; Kuhn & Crowell, 2011; Nussbaum & Edwards, 2011; deVries, Lund & Baker, 2001). Traditionally, research on how to support student argumentation has focused on cognitive prerequisites (e.g., verbal skills, knowledge, argumentive skills), task design (e.g., dyad formation, conflicting information, controversial topics, instructions) and real-time, structural dialogue support (e.g., sentence openers, teacher prompts, scripts). Based on an extensive review of the available literature, Asterhan and Schwarz (2016) concluded that this impressive body of empirical work has resulted in partial success only.

Argumentation scholars have then become increasingly interested in the social, affective and motivational dimensions of classroom argumentation and how these may inhibit or enable certain

discourse types (see Asterhan & Schwarz, 2016, for a review; e.g., Bathgate, Crowell, Schunn, Cannady, & Dorph, 2015; Clarke, 2015; Nussbaum, 2005; Lin, Anderson, Jadallah, Nguyen-Jahiel, Kim, Kuo, & Li, 2015). In the present study, we focus on two such factors, namely achievement goals and gender, and explore how they are associated with different student discourse styles. In the next sections, we first describe the main features of productive argumentation for learning and contrast it with three other patterns of interaction that (may) evolve when a student is asked to discuss his/her understandings with a disagreeing peer. Following, we outline why achievement goals and gender are expected to be particularly relevant constructs to be considered and how they are expected to be associated with these four interaction patterns.

Peer argumentation: ideal and reality

In spite of some unavoidable differences in detail and in branding, there is considerable consensus among scholars about the type of argumentive dialogue that supports learning and development (e.g., Asterhan & Schwarz, 2016; Berland & Lee, 2012; Johnsson, Johnsson & Smith, 2000; Michaels, O'Connor & Resnick, 2007; Resnick, Asterhan & Clarke, 2015; Wegerif, Mercer & Dawes, 1999). It is dialogue in which students reflect upon, explain, and articulate their own thinking. They seek to clarify misunderstandings. They scrutinize, challenge and compare different ideas, but do so in a collaborative, supportive atmosphere. Thus, even though criticism and challenges are an essential and even defining feature of argumentive discourse (van Eemeren, Grootendorst, Henkenmans, Blair, Johnson & Krabb, 1996; Walton 2006), models for productive classroom argumentation emphasize that these should be issue-driven, and not person-driven (Keefer et al, 2001) as the ultimate goal is collaborative sense-making, rather than persuasion. This type of argumentive discourse has been termed *deliberative argumentation*

(Asterhan & Babichenko, 2015; Asterhan & Schwarz, 2016; Felton, Garcia-Mila & Gilabert, 2009).

As aforementioned, deliberative argumentation is not easily elicited, however. When students are instructed to conduct a critical, argumentive discussion representing different views, scrutiny over the dialogues that enfold often shows that only some actually resemble deliberative argumentation. For example, in a study on undergraduate students' argumentation during a heavily supported science argumentation task, only half of dyads genuinely engaged in some form of deliberative, reasoned argumentation about the difference between conflicting views (Asterhan & Schwarz, 2009). The other discussions were consensual and one-sided, void of any critical, scrutinizing stance.

Students may not feel comfortable being challenged or having to challenge the ideas proposed by their partner. Anticipation of a critical discussion with a disagreeing peer may also raise uncertainty about one's own competence, especially in competitive contexts (Butera & Mugny, 1995; Darnon, Butera & Harackiewicz, 2007) or on particularly difficult topics and tasks. In order to avoid embarrassment, public exposure of a lack of competence, or the mere unpleasantness of discord, learners may choose to avoid disagreement altogether and seek a quick consensus, without much cognitive engagement and without further exploring differences (Asterhan, 2013; Keefer et al., 2000; Smith et al, 1981; Weinberger & Fischer, 2006). In the latter case, students "seem willing to simply accept and build on the first claim presented" (Keefer et al., 2000, p. 73). Whereas seeking consensus as an ultimate goal can lead to productive discussions, the occurrence of overt agreement and consensus during discussion do not predict learning outcomes (Asterhan & Schwarz, 2007; 2009; Howe, 2009; Keefer et al,

2000). Moreover, premature consensus, without further scrutiny of alternatives and exploration of differences, runs counter to the essence of argumentation.

In contrast, instructions to discuss one's views with a disagreeing peer may also evolve into critical discussions that are void of collaborative construction and exploration, but characterized by interpersonal competition and persuasion. This debate-like type of dialogue has been termed *disputative argumentation* (Asterhan & Babichenko, 2015; Asterhan & Schwarz, 2016; Felton et al., 2009). Disputative and deliberative discussions may show similar numbers of critical dialogue moves (e.g., critical questions, rebuttals, counterarguments). In disputative argumentation, however, these are marked with distinctive rhetorical features that emphasize interpersonal repartition, ego-enhancement and/or an increase in face-threat during disagreements (Asterhan, 2013). Others have found that disputative argumentation is often characterized by shorter dialogue turns (Felton et al., 2015; Mercer, 1996) and by one-sided arguments that repetitively support one's own, original claims without dealing with the opponent's (Asterhan, 2013; Berland & Reiser, 2011; Felton et al., 2009). Recent experimental research has shown that compared to deliberative discussions, disputative argumentation negatively affects student learning outcomes (Asterhan & Babichenko, 2015; Asterhan & Hever, 2015) and argumentive essay writing quality (Felton, Crowell, & Liu, 2015; Felton, Garcia-Mila, Villarroel, & Gilabert, 2015).

To summarize, instructions to engage in argumentation with a disagreeing peer can in fact evoke a variety of discourse types. Three patterns emerge from the literature: deliberative peer argumentation, disputative peer argumentation, and quick consensus seeking. The question is then, what leads some students to successfully engage in argumentation that is both critical and co-constructive (deliberative argumentation), whereas others resort to debate-like, disputative

argumentation or avoid critical discussions altogether? How can one avoid the latter two situations and promote the former? In the following sections, we discuss how theory and research on achievement goal theory and gendered interaction styles may bear on this issue.

Achievement goals and peer interaction

Intentional approaches to motivation assume that a fruitful way to understand how and why people behave as they do is to ask what goals they are pursuing and striving to attain. Achievement goal theorists distinguish between several classes of goals for learning, which rest on different conceptions of success and create distinct systems of meaning, motivation, and behavior (e.g., Ames, 1992; Dweck, 1999; Harackiewicz, Barron, Pintrich, Elliot, & Thrush, 2002). In brief, students pursue mastery goals when they define success in terms of developing their ability, knowledge or skills (learning, progress). In contrast, students pursue performance goals when they define success in terms of demonstrating their ability, knowledge or skills, especially relative to others. They strive to prove superior ability (performance-approach goal) or to avoid the demonstration of inferior ability (performance-avoidance goal).

Scores of studies have confirmed that achievement goals matter because they are associated with differences in the ways students define and evaluate success, seek and process information, and regulate behavior. Of particular relevance in the present context, mastery and performance goals have traditionally been associated with different responses to difficulty and challenges (e.g., Butler, 2000; Midgley, Kaplan & Middleton, 2001 for early reviews). Mastery goals orient students to seek challenge, to construe failure as a sign that they need to learn, and to actively seek information and help relevant to understanding and overcoming difficulty. Performance-avoidance goals, on the other hand, have been linked with maladaptive, poor learning strategies, unwillingness to seek help, and openness to cheating to cover up for poor performance or ability.

The literature on performance-approach goals has shown a more mixed set of results, with both negative, as well as positive outcomes. Recent advances in this field suggest that the findings concerning performance-approach goals depend on whether they are defined in terms of appearance and ability concerns (a desire to appear smart) or in terms of normative competence (a desire to outperform others) (Hulleman, Schrager, Bodmann, & Harackiewizc, 2010; Senko & Dawson, 2017). Only appearance-based performance goals were found to be correlated with maladaptive learning behaviours, such as self-handicapping and help-avoidance behavior (Senko & Dawson, 2017).

Achievement goals and their association with student learning behavior and outcomes have been studied extensively in individual tasks, but significantly less so in peer learning contexts. There are grounds for venturing that students who pursue different goals for learning will also adopt different strategies for discussing, exploring and resolving disagreements with a peer. Specifically, because mastery goals seem to orient students to embrace challenge as well as to pursue cooperative rather than competitive social goals (Ames & Archer, 1988), they might be more inclined to conduct a deliberative, issue-focused discussion with a disagreeing peer.

In contrast, performance goals might orient students toward less desirable discourse styles. Performance-approach goals are likely to be associated with a more disputative discourse style, regardless of whether the former are construed in terms of appearance concerns and ability demonstration or in terms of social and normative comparisons (Grant & Dweck, 2003; Hulleman et al., 2010; Senko & Dawson, 2017). Undermining the opponent's responses and defending one's own serves both the purpose of appearing competent, as well as the purpose of outperforming the other in peer argumentation. Performance-avoidance goals, on the other hand, are likely to be associated with a tendency toward quick consensus seeking, as it allows students

to conceal a (perceived) lack of (relative) competence. Having to share one's own incomplete understanding of a complex topic and subjecting it to peer critique may be avoided by conceding and letting the partner lead the discussion.

A reading of the available empirical research on the role of achievement goal in peer-to-peer learning shows that mastery goals seem to be positively associated with a general willingness to contribute and share one's own knowledge with the group, whereas the role of performance goals in peer interaction is less clear-cut (Harris, Yuill, &Luckin, 2008; Gabriele & Montecinos, 2002; Schoor & Banner, 2011). For example, Harris et al. (2008) found that young children who received mastery goal instructions on a dyadic task had more elaborated problem solving discussions than dyads who received performance goal instructions. In another small scale study, however, Gabriele and Montecinos (2002) did not find that such instructions affected the amount of talk or the nature of peer interaction during a collaborative task. In a computer-mediated, controlled setting, Schoor and Banner (2011) found that only avoidance goals were associated with less contributions to a simulated peer group task.

Achievement goals have also been considered in the context of peer-to-peer information and knowledge sharing[1]. Mastery goals have been associated with more honest information disclosure with peers, compared to performance goals (Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2007). A study on teenage after-school, peer-to-peer sharing of learning-related materials through social network technologies showed that mastery goals predict higher rates of sharing (Asterhan & Bouton, 2017). The relation with performance approach goals, on the other hand, was moderated by *quid pro quo* expectations. A negative correlation with knowledge

[1] *Information* or *knowledge sharing* is a common term in organizational psychology and information sciences. It refers to acts in which an individual makes information and knowledge that is at his/her disposal available to others, such as when a student shares her lecture notes on a personal blog. In contrast, the term *group collaboration* is reserved for situations in which group members work together on a group task to achieve a certain group goal.

sharing was found for students who did not expect future benefits from sharing, and a positive correlation when they did.

Importantly, however, none of the abovementioned studies specifically focused on contexts in which two or more peers discussed different cognitions, understandings or opinions, nor on *how* they attempted to resolve these disagreements. In an important series of studies, Darnon and colleagues (Darnon & Butera, 2007; Darnon, Butera & Harackiewicz, 2007**;** Darnon, Muller, Schrager, Pannuzzo, & Butera, 2006; Sommet, Darnon & Butera, 2015; Sommet, Darnon, Quiamzade, Pulfrey, Dompnier, & Butera, 2012) did exactly that. They found that mastery goals positively predicted the degree to which students reported that they would respond to a disagreeing peer by reconsidering the validity of their own position (what they referred to as epistemic conflict regulation), and performance-approach goals positively predicted the extent in which they would try to devaluate their partner's and affirm their own position (what they referred to as competitive personal conflict regulation) (Darnon & Butera, 2007; Darnon et al., 2006). In a set of separate studies, they specifically focused on the two types of performance goals and showed that individual differences in performance avoidance goals are associated with, what they refer to as, protective personal conflict regulation (Sommet et al., 2012, 2015). These findings are then consistent with the suggestion that achievement goals might orient students toward different types of argumentive discourse with a disagreeing peer. Even though there is considerable overlap, however, a comparison between the operationalization and conceptualization of *conflict regulation* in these studies and of *argumentive discourse styles* in the present work reveals a few differences:

First, items on the epistemic conflict regulation scale by Darnon and colleagues mainly refer to the degree to which students re-examine their own position in response to disagreement,

without further specification of how this is reflected in the peer interaction setting (e.g., “try to think of a solution that could integrate both points of view?" "try to think about the text again in order to understand better?"). However, reconsidering and exploring different views may be achieved through social interaction and peer discourse (i.e., asking the peer partner why he/she thinks different from me) or individually, without any further peer interaction (i.e., re-examining ideas independently and on one’s own). We then propose to distinguish between two types of issue-driven conflict regulation, *deliberative argumentation* through peer discourse and *private deliberation*, and assess them separately by specifying the actions that accompany them.

Second, in the aforementioned studies, the learning tasks and domains that have been chosen are such for which students already have the correct answer and are confident about it (e.g., Darnon et al., 2006), or are of the type for which both alternative positions are in fact correct and should be integrated for a complete solution (i.e., complementary information tasks, such as the primacy and the recency effect in working memory). Survey items for epistemic conflict regulation reflect this complementary view (see aforementioned examples). However, argumentation is not necessarily about compromise and integration, but about juxtaposition of different views or solutions that are compared and weighed through reasoning. On conceptual change tasks, for example, an integration of two misconceptions does not equal the correct, scientific concept (see also Asterhan, Schwarz & Cohen-Eliyahu, 2014). Thus, whereas our conceptualization of deliberative argumentation refers to attempts to understand the others' viewpoints on a complex topic and how they arrived at them, it does not include, by definition, a need to integrate the two sides.

Third, the construct of protective personal conflict regulation in the aforementioned studies includes explicit references to student beliefs that the peer partner is in fact correct (i.e., "I think

[my] partner was certainly more correct than [me]" and "I agree with his/her own way of viewing things"). Yet, the notion of quick consensus seeking presented here more specifically and exclusively refers to overt peer interaction behaviors and to interaction goals, regardless of how the peer and/or his competence is perceived. Thus, even if a student believes the other is correct, ideally he or she would still probe more, compare the two solutions and explore why one's own solution is faulty, so as to deepen understanding. Vice versa, students may seek a quick, superficial agreement in the interaction, even when they are privately convinced they already know the correct answer. Thus, in our measures of quick consensus seeking, items specifically and only target the interaction behaviors and the lack of critical engagement, without further reference to the student's estimations of the peer partner's knowledge state or status.

In sum, one of the main objectives of the two studies presented here is to examine whether students' achievement goals predict four distinct self-reported patterns of discussion behavior with a disagreeing peer on complex topics for which students have robust misconceptions, that is market pricing (e.g., Davies & Mangan, 2007; Leiser & Halachmi, 2006) and astronomy (e.g., Schwarz, Schur, Pensso & Tayer, 2011; Vosniadou, Skopeliti & Ikospentaki, 2005). Based on the aforementioned rationale and the refinements to the Darnon et al framework proposed here, the following predictions are formulated:

H1: Four patterns of argumentive discourse behavior with a disagreeing peer can be discerned reliably: disputative argumentation, deliberative argumentation, quick consensus seeking and private deliberation.

H2a: Mastery goals will be positively associated with students' preference to consider the other's solutions and re-examine their own ideas privately (private deliberation).

H2b: Mastery goals will be positively associated with students' willingness to critically analyze both their own and others' solutions through discussion (deliberative peer argumentation).

H2c: Performance-approach goals will be positively associated with disputative argumentation, similar to Darnon et al.'s findings on competitive personal conflict regulation.

H2d: Performance-avoidance goals will be positively associated with quick consensus seeking, i.e., trying to reach a quick agreement without genuinely trying to explore nor articulate differences.

Following evidence of relations between argumentation quality and prior domain-specific knowledge (Means & Voss, 1996), it was also examined whether participants' perceived domain-specific competence perceptions and confidence in the correctness of one's solution would further add to the prediction of discourse styles. In particular, confidence and competence perceptions could be expected to correlate positively with and add to the prediction of disputative argumentation, as well as private deliberation. An individual student who is highly confident about the correctness of his or her answer is likely to prefer an assertive and dominant style in peer interaction more. Similarly, students who are confident and perceive themselves as knowledgeable in the domain may tend to prefer individual problem solving, which may be perceived as a more efficient option for them. A reverse pattern may be expected for quick consensus seeking: Students who do not feel confident or knowledgeable are likely to prefer that the peer partner leads.

Gender and discourse style

Differences in discourse styles among men and women have been a longstanding interest in sociolinguistics (e.g., Lakoff, 1975; Herring, 2003; Tannen, 1990). The overall pattern of findings from this literature about gendered discourse styles seem particularly relevant to the

four argumentive discourse styles discussed in the present work. For example, Maltz and Borker (1982) distinguished between the more competitive, adversarial speech characteristic of boys, which aims at asserting and maintaining dominance, and the more collaborative, affiliative speech of girls, which aims to "create and maintain relationships of closeness and equality" (p. 424). Tannen (1990; 1994) proposed that, notwithstanding individual and contextual differences, men tend to approach conversations more as "negotiations in which people try to achieve and maintain the upper hand if they can, and protect themselves from others' attempts to put them down and push them down" (p. 24-25). Women, on the other hand, are overall more likely to approach it as a network of connections in which "conversations are negotiations for closeness and people try to seek and give confirmation and support, and to reach consensus" (p. 25). The existence of gender-related differences in discourse style has been supported in a range of empirical studies that gathered data from different settings, topic domains, and age groups (e.g., Cameron, 1998; Herring, 2003; Leman, 2010; Maccoby, 1998; Mullaney, 2007; Stokoe, 2000; Weatherall, 2000). More recent research has linked group work effectiveness with gender-related differences in empathy, or the ability to correctly "read the mind" of other human beings (Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). The literature on gendered discourse styles has also been critiqued, however, as some have raised questions about the evidence base of some studies (e.g., Goldsmith & Fulfs, 1999), as well as about the extent of differences and similarities across and in gender groups (e.g., MacGeorge, Graves, Feng, Gillihan & Burleson, 2004).

In light of this literature, it is somewhat surprising that the role of gender and of gendered discourse style has received very little attention in the study of argumentation and classroom discussions. Following are some exceptions: In a study on computer-mediated argumentation of

junior high school students, Asterhan, Schwarz and Gil (2012) reported that all-female groups scored higher than all-male groups on measures of participation rates, interaction density and argument complexity. The latter (argument complexity) seems to indicate that all-girl student discussions contains more reasoned and more two-sided arguments, which has been described as a feature of deliberative argumentation (Felton et al., 2015). Caspi, Chajut and Sapporta (2008) reported higher participation rates in online classroom discussions for female students, but did not consider differences in qualitative features of the dialogue. Nussbaum and Bendixen (2003) reported on low correlations between gender and self-reported tendency to avoid or to approach verbal arguments and argumentation. However, further analyses showed that individual differences on personality characteristics (i.e., warmth and assertiveness) accounted for these associations with gender. Moreover, the measure for argumentation used in this study (i.e., argumentativeness) strongly focuses on interpersonal arguments and conflicts (i.e., "having arguments") and less on argumentation as a type of reasoned discourse. Finally, Sullivan, Kapur, Madden and Shipe (2015) analyzed online synchronous discussions between male and female high school students working in mixed-sex, small peer groups on physics problems. They reported on overall patterns of engendered discourse styles (namely, direct-confrontational for male and indirect-harmonious for female students).

In light of the relative sparsity of research on gender differences in student argumentation in educational settings, on the one hand, and the potential relevance of gender to this field, on the other, the present work seeks to explore the existence of differences between male and female students' argumentive discourse styles. Based on the aforementioned literature, the following hypotheses are formulated:

H3a: Male students will favor disputative argumentation more than female students, as it resembles the male gendered discourse style described in the literature (e.g., characterized by confrontation, self-protection and dominance).

H3b: Female students will favor quick consensus seeking more than male students, as it resonates with certain characteristics of female engendered discourse style (e.g., avoidance of confrontation and consensus seeking).

H3c: Female students will favor deliberative argumentation more than male students, as it resonates with characteristics of female engendered discourse style (namely, seeking to understand the other and a relational focus).

H3d: Male students will favor private deliberation more than female students, as it resonates with findings showing lower overall participation rates in learning dialogues, discourse style differences (e.g., emphasizing independence), and male preferences for individual over collaborative learning tasks (e.g., Light & Littleton, 1999).

The present study

These hypotheses were tested in two separate self-report studies among Israeli undergraduate students. Information about male and female students' achievement goals was collected. They then answered questions about how they would behave when asked to discuss their understanding of a difficult topic with a peer who disagreed with them. In Study 1, the topic was a complex question in everyday astronomy (i.e., about the phases of the moon and the day/night cycle from an unusual perspective). In Study 2, which was designed to replicate findings from Study 1 in a different domain, it concerned a complex topic from economics (i.e., fluctuations in market pricing). For both topics, students have some everyday knowledge that bears on the questions and have had some formal education in the domain, but these concern

challenging topics for which both children and adults have been documented to retain robust misconceptions, namely market pricing (Davies & Mangan, 2007; Leiser & Halachmi, 2006) and everyday astronomy (Schwarz et al., 2011; Vosniadou et al., 2005).

Study 1

Method

Participants. Participants were 245 undergraduate students (118 males, 127 females) from the Education (30%), Humanities (8%), Social Sciences (47%), Law (3%) or other (3%) faculties of a large university in Israel. Average age was 24.47 (*SD* = 3.97). The majority (*N* = 222) were Jewish, others had Arab or Druze ethnic backgrounds. Participation was voluntary, and participants were offered course credit or a payment of approximately US$5. About half (58%) of them chose course credit. Students from the Life, Exact and Earth Sciences were excluded from participation.

Instruments

Achievement goals. Personal achievement goals were assessed with an 18 item survey developed by Elliott and Church (1997), translated to Hebrew and validated by Kogut (2002). Students rated their agreement with predefined statements on a Likert scale, ranging from 1 (not true for me) to 7 (very true for me). They were instructed to answer the questions in relation to a big introductory course in their first or second year BA major studies. The survey included six mastery goal items (e.g., "I hope that after the course I will have a better and deeper understanding of the topics we learned", α = .79) and six performance-approach goal items (e.g., "It is important for me to perform better than the other students in this course", α = .89). One of the original six performance-avoidance goal items (i.e., " I would prefer that no grades would be given in this course") significantly decreased the internal reliability of this scale and was,

therefore, omitted. The remaining five items (e.g., "I just want to avoid failing the course") showed satisfactory reliability ($\alpha = .70$).

Peer argumentive discourse style. The peer argumentive discourse style (PADS) questionnaire consisted of two separated parts. In part I, students were instructed to answer a question about a knowledge domain, in this case astronomy. They were shown a picture of the earth which was taken by a robot stationed on the moon (see Figure 1).

Insert Figure 1 About Here

They then responded to a multiple-choice question asking whether it was dark or light on the moon location from which the picture was taken. They were asked to choose one of four reponses and then justify and explain their choice. The responses were: (a) "*It is light*"; (b) "*It is dark*"; (c) "*There is no difference between light and dark on the moon*"; (d) "*It cannot be determined whether it is light or dark*". This topic domain was chosen because students are familiar with and have been taught the basics of the lunar and solar system in formal education. Based on pilot study findings, students found the particular question intriguing, yet difficult. The responses showed that it raised conflicting answers, even if the general domain feels familiar to all. Thus, students were expected to realize that they could learn from discussion with another person, should they wish to. Students rated their perceived confidence in their answer on a scale ranging from 1 (not at all confident) to 4 (very confident), and rated their perceived domain knowledge of astronomical topics on a scale anchored at 1 (none) to 5 (very high).

The next page (Part II) presented the following instructions:

> Try to place yourself in the following situation: You participate in a small-size course in your Major studies and your lecturer instructs each student to solve the Moon question. The lecturer then assigns the students to dyads and instructs each dyad to discuss their solutions to the Moon question. When the

student you are assigned to presents his/her solution, it appears that you disagree on the correct solution (i.e., he/she chose a different answer). How would you behave in such a situation?

They then rated the degree to which each of 15 items would describe their behavior during that discussion (see Table 1 for all the translated items), on a Likert scale ranging from 1 (*not at all*) to 7 (*exactly*). Four items each were created to assess *deliberative argumentation* (items 1-4 in Table 1), *disputative argumentation* (items 5-8), and *quick consensus seeking* (items 9-12). Three items assessed *private deliberation* (items 12-15).

Insert Table 1 Here

A confirmatory factor analysis (CFA) using structural equation modelling (SEM) was conducted on the combined data set of both studies to find support for the four-factorial structure of the PADS tool. Student responses with missing data were excluded, resulting in an overall data set of $N = 322$ for this analysis. Preliminary checks showed that internal reliability was high for deliberative ($\alpha = .83$, 4 items) and for disputative argumentation ($\alpha = .84$, 4 items), and satisfactory for private deliberation ($\alpha = .71$, 3 items). Internal reliability for the quick consensus-seeking items was at the low end ($\alpha = .63$, 4 items), however. A four-factor CFA with all 15 items revealed that the item "*I would prefer to concede and terminate the discussion quickly*" from the quick consensus-seeking scale showed a negative residual variance. Omitting this item reduced internal reliability for this scale significantly ($\alpha = .51$) and yielded marginal indices of fit for the CFA, $\chi^2 (70) = 230.251$, $p < .001$, RMSEA= .08, CFI = .90, TLI = .90, SRMR = .0752. Moreover, under this model, the standardized regression loading of a second item from the consensus-seeking scale ("*I would prefer that the other leads the discussion and develops his/her solution*") was low and only marginally significant (.14, $p = .059$) and consensus-seeking did not

correlate with two out of the three other scales. Further omission of this second item from the model resulted in deteriorated model fit indices, however[2].

As CFA is very sensitive to internal reliability, it was decided to not include the consensus-seeking test items in the model. A three-factorial CFA with the remaining 11 items showed good indices of fit, CFA, χ^2 (40) = 93.54, p <.001, RMSEA= .065 (.048-.082), CFI = .961, TLI = .947, SRMR = .0553. Standardized item loadings (according to order of presentation in Table 1) were .67, .76, .73 and .82 for deliberative argumentation, .88, .66, .58 and .84 for disputative argumentation, and .60, .68 and .71 for private deliberation. All loadings were statistically significant. There was a moderate, negative correlation between deliberative and disputative argumentation (r = -.33) and moderate positive correlations between individual deliberation and deliberative argumentation (r = .44) and disputative argumentation (r = .25). Taken together, these results show that the pattern of associations between the three factors support the claim that they tap different aspects of discussion behavior with a disagreeing peer.

Given that the internal reliability of the quick consensus-seeking scale was significantly higher when all four items were included, and that this four-item scale showed low to no Pearson correlation with the other three scales (-.14 with deliberative argumentation, none with the other two, N = 322), we decided to include it in further analyses as a separate measure. Findings concerning this measure should be interpreted with caution, however, as its internal reliability was not high (α = .63, N = 322 and α = .60 in each of the samples, separately).

Procedure. Students were instructed that the goal of the study was to explore student learning and discussion practices in university classes. They then responded to the two

[2] It is possible that the two more problematic items (*I try to reach an agreement as fast as possible* and *I would prefer to concede and terminate the discussion quickly)* tap into an additional motivation, namely the intent to finish learning tasks quickly, regardless of whether one wishes to avoid confrontation with a disagreeing peer.

questionnaires in pen-and-paper format. They were told they could not go back and change responses. Order of presentation was counterbalanced. Course credit and financial reimbursement for participation was given upon completion. Completing the questionnaires took between 10-15 *min*.

Results

About one third of the students (N = 82) chose the correct answer to the astronomy item ("It cannot be determined"). To rule out that any potential relation between confidence and perceived knowledge and peer interaction behavior could be explained by the fact that "correct" students were aware of their correctness and would as a result prefer more dominant behavior, mean confidence and perceived knowledge scores were compared between students who had chosen the correct and those who had chosen incorrect answers. In fact, students who chose the correct response reported lower confidence levels (M = 2.17, SD = .95) compared to those who had chosen an incorrect one (M = 2.40, SD = .81), t (242) = 2.01, p = .046. Perceived knowledge scores showed a similar pattern (M = 2.40, SD = .86 and M = 2.57, SD = .77, respectively), but this difference was not significant, t (242) = 1.58, p = .115. No order effects were found. Indexes for the four PADS and the three achievement goals variables were created by averaging the scores of the corresponding items. Surveys with more than 3 missing values were excluded from relevant analyses. This comprised four complete PADS surveys and one complete goal achievement survey, as well as an additional nine PADS surveys with 4 missing values. In all other cases, the average was computed based on the remaining responses for that particular variable. Kurtosis and skewness of the different variables all ranged between -1 and 1. Table 2

presents the Pearson correlations between three achievement goals, the four discourse styles, confidence and perceived domain knowledge in Study 1.

Insert Table 2 About Here

Predicting discourse styles with achievement goal. Separate hierarchical regression analyses were conducted to predict each of the four discourse style types. The three achievement goals were entered in step one. Confidence in the correctness of one's explanation and perceived knowledge of astronomy were added in step 2. Exclusion of incomplete surveys resulted in a final data set of $N = 231$[3]. Results from the regression analyses are presented in Table 3.

Insert Table 3 About Here

Deliberative argumentation. As expected, mastery goals strongly predicted deliberative argumentation ($\beta = .32$), whereas performance-approach goals did not. In addition, performance-avoidance also added to its prediction ($\beta = .13$), which was not expected. Altogether, the first model explained 13% of the variance of deliberative argumentation, F (3, 227) = 12.19, $p < .001$. Adding confidence and perceived knowledge measures did not improve the predictive power of the model, $\Delta R^2 = .01$, F_{change} (2, 225) < 1.

***Disputative argumentation*.** The first model explained only 6% of the variance in disputative argumentation, F (3, 227) = 7.31, $p = .004$. Of the three achievement goals, only performance approach goals was a positive significant predictor of disputative discourse. The addition of confidence and perceived knowledge scores to the model resulted in a significant increase in the explained variance, $R^2 = .17$, $\Delta R^2 = .11$, F (2, 225) = 15.47, $p < .001$. As hypothesized, disputative argumentation was predicted by performance-approach ($\beta = .23$) and

[3] An alternative procedure, by which the four missing values in the incomplete PADS surveys were replaced by the mean score of the respective index, yielded nearly identical results when these nine surveys were included in the regression analyses ($N = 240$).

by confidence (β = .29). Thus, individuals who are confident about the correctness of their response and are motivated by performance goals tend more towards dispute-like discourse with a disagreeing peer.

***Quick consensus seeking*.** In the first model, individual achievement goals predicted 5% of the total variance on quick consensus seeking, F (3, 227) = 4.25, p = .006, with performance-avoidance goals as positive (β = .18) and mastery goals as negative predictors (β = -.14). The addition of confidence and perceived knowledge ratings did not alter this pattern and did not add to the prediction of quick consensus seeking, ΔR^2 = .01, F (2, 225) = 1.01, p = .335.

***Private deliberation*.** Private deliberation was positively associated with mastery goals (β = .28) only, F (3, 227) = 8.15, p < .001. Adding confidence and perceived knowledge scores to the model resulted in a significant increase in the explained variance, ΔR^2 = .04, F (2, 225) = 4.54, p = .012, and explained 13% of the total variance on the private deliberation measure. In particular, perceived domain knowledge positively predicted private deliberation over and above individual difference in mastery goals (β = .20).

Gender differences in discourse styles. To test our hypotheses about gender differences on socio-cognitive conflict regulation in peer interaction, the mean scores of male and female students were compared with one-tailed, independent samples t-tests. The mean and standard deviations are reported in Table 4. In accordance with hypothesis 3a, a significant gender difference in favor of female students was found on deliberative argumentation with a disagreeing peer, t(231) = 2.00, p = .029, with small effect size Cohen's d = .26. In addition, males were found to report higher confidence about their own explanations, than female students, t(232) = 2.13, p = .034, d = .30. However, contrary to expectation, no gender

differences were found on the other 3 peer discourse indices (disputative argumentation, quick consensus seeking or private deliberation).

Insert Table 4 About Here

Discussion

The present results confirm that students' intentions to engage in four distinctive discourse styles (deliberative argumentation, disputative argumentation, quick consensus seeking and private deliberation) were associated with individual differences in students' achievement goals in a pattern that reflected the hypotheses. Disputative argumentation was predicted by performance-approach goals and students' confidence ratings about the correctness of their chosen solution. Deliberative argumentation, on the other hand, was mainly predicted by mastery goal, as expected, but also by performance-avoidance goals, which was not expected. Tendencies to seek a quick consensus without actively exploring the differences between one's own and the peer's solution were positively predicted by performance-avoidance goals (as hypothesized), as well as negatively by mastery goals. Finally, private deliberation was predicted by the endorsement of mastery goals and self-reported knowledge ratings in the topic domain.

With regard to gender effects on discourse styles, the results confirmed the expectation that female students would show a stronger tendency to engage in deliberative argumentation, compared to male students. In contrast to expectations, no gender differences were found on the other three discourse types. To examine whether the findings reported here represent a stable pattern and can be replicated in another setting, the hypotheses were tested in a new sample and within a different topic domain (i.e., market pricing)

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Study 2

Method

Participants. One-hundred-and-two undergraduate students from the Social Sciences and Humanities departments of a large Israeli university participated in this study (48% male). Four participants only completed the demographics questions and were omitted from the data analyses. The majority of remaining 98 participants (73%) identified as Jewish, 13% as Arabic (Muslim or Christian) and 15% did not provide an ethnic or religious affiliation. Students from Economics and Business management programs were excluded from participation. Participation was on a voluntary basis. About two-third of the participants received course credit for participation, whereas the remainder opted for a $5 reimbursement. Two students completed only the demographic data and were therefore excluded from the final data set.

Tools and Procedure. The tools and procedure were identical to Study 1, with the exception of the knowledge domain in part one, which was changed from astronomy to economics. Participants were asked about the main reason behind the ongoing, steep rises in housing market prices in the major residency areas in Israel (i.e., Central coast and Jerusalem area). This topic has direct relevance to most students and appears often in public discourse. They then chose one of four different options (rises in salaries; interest rates and interest rate policies; the number of available houses on the market; foreign investments in Israel) and explained their choice.

Results

Predicting discourse styles with achievement goals. Two participants skipped an entire PADS survey and two others skipped the achievement goal survey, resulting in an overall data

set of $N = 96$ for these analyses. Kurtosis and skewness of all variables ranged between -1 and 1. Table 5 presents the Pearson correlations between the three achievement goals, the four discourse styles, confidence and perceived domain knowledge in Study 2. To test whether the results from Study 1 could be replicated in a new sample, stepwise regression analyses were conducted to predict each of the four argumentive discourse types. As in Study 1, the three achievement goals were entered in step one, and confidence in the correctness of one's explanation and perceived knowledge of real estate market pricing were added in step 2 (see Table 6).

Insert Tables 5 and 6 About Here

Deliberative argumentation. As in Study 1, deliberative argumentation was strongly predicted by mastery goals (β = .69). None of the other variables were found to add to this prediction. A total of 46% of the variance in deliberative argumentation was explained by the model, F (3, 92) = 26.00, $p < .001$.

Disputative argumentation. Similar to the findings in Study 1, performance approach goals contributed positively to the prediction of disputative argumentation (β = .24). In contrast to Study 1, however, mastery goals were also a strong, negative predictor (β = -.42) in this sample. The addition of confidence and perceived knowledge scores improved the model, $\Delta R^2 = .08$, F_{change} (2, 90) = 4.91, $p = .009$, explaining 30% of the variance in disputative argumentation scores, F (5, 90) = 7.79, $p < .001$. However, self-reported confidence was only a marginally significant predictor in this sample (β = .23, $p = .061$)

Quick consensus seeking. An identical pattern of findings to those in Study 1 was found. Quick consensus seeking was positively predicted by performance-avoidance goals in both models (β = .29 and β = .27, respectively), whereas mastery goals negatively predicted quick

consensus seeking (β = -.24 and β = -.19). The first model explained 12% of the variance on consensus seeking scores, F (3, 92) = 5.16, p = .002. Similar to Study 1, the addition of confidence and knowledge perception ratings did not improve the predictive power of the model, ΔR^2 = .037, F (2, 90) = 2.04, p = .136.

***Private deliberation*.** Private deliberation was only predicted by mastery goals (β = .341), R^2 = .394, F (3, 92) = 5.25, p = .002. The addition of subjective knowledge ratings, which was a relatively strong predictor of private deliberation in the Study 1 sample, and of confidence did not improve the predictive power of the model, ΔR^2 = .013, F < 1.

Gender differences in discourse styles. Table 7 presents the mean peer discourse type scores for male and female students. In accordance with hypothesis 3d, male students scored higher than female students on private deliberation, t(96) = 2.48, p = .008, d = .50. However, contrary to expectation, no gender differences were found on deliberative argumentation, disputative argumentation, or quick consensus seeking. Like in Study 1, male students reported more confidence in the solution they thought was correct, t(96) = 3.23, p = .001, d = .64. However, unlike in Study 1, they also rated their own knowledge on the topic of housing market prices higher than female students did, t(96) = 3.88, p < .001, d = .67.

Insert Table 7 About Here

Discussion

The pattern of associations between individual achievement goals and discourse styles with a disagreeing peer was overall consistent with the hypotheses and with the pattern observed in Study 1. Deliberative argumentation and private deliberation were both predicted by mastery goal endorsement, whereas performance-avoidance (positively) and mastery goals (negatively) predicted quick consensus seeking. Even though in Study 1, a weak association between

performance avoidance and deliberative argumentation was found, this was not replicated in Study 2. Across the two studies combined, the pattern of findings concerning deliberative argumentation then does seem to confirm expectations. As in Study 1, performance-approach goals and confidence ratings predicted students' tendency to engage in disputative argumentation. However, so did lower endorsement of mastery goals in this sample, which is in alignment with the overall rationale of the present framework, even though it was not expected. As in Study 1, gender differences on discourse style were only found on one of the four discourse styles, albeit on a different one this time. As hypothesized, males reported a higher tendency for private deliberation than female students.

General Discussion

Scholars of argumentation and classroom dialogue have become increasingly interested in the social, affective and motivational dimensions of student learning dialogues and how these may inhibit or enable certain discourse types (Asterhan & Schwarz, 2016). Based on distinctions made in the literature, we distinguished between four discourse styles that may ensue when students are asked to discuss a cognitively challenging topic with a disagreeing peer. Ideally, learners will explore differences between solutions and adopt a critical stance towards their own and their peer's ideas, but do so in a collaborative and constructive manner (deliberative argumentation). In contrast, they may be critical in a competitive and debate-like manner, in which they defend their own ideas at any price and undermine the other's (disputative argumentation), they may seek a quick agreement without further exploration of differences or critique (quick consensus seeking), or they may choose to re-think and reflect on their own and the peer's solution privately without further discussion (private deliberation).

Results confirmed that students' intentions to engage in three of these four discourse styles can be reliably and distinctively assessed with the help of the PADS self-report scales. Assessment of the fourth discourse style, quick consensus seeking, requires further improvement, however, as the internal consistency reliability of this scale was not very high. Sommet and colleagues (2012; 2015) have reported similar difficulties with their self-report scale on protective social regulation. Taken together, this indicates that the assessment tools for measuring intent to engage in these behaviors needs further refinement.

These four discourse styles were predicted by differences in students' achievement goals in a pattern of results that is overall consistent with expectations: Willingness to engage in a critical, yet constructive discussion with a disagreeing peer on one's own and his/her thinking (i.e., deliberative argumentation) was positively predicted by endorsement of mastery goals. When students strive to avoid the demonstration of inferior performance (high performance-avoidance goals), however, they were more likely to seek a quick consensus without further exploration of differences. Even though deliberative argumentation and quick consensus seeking are in essence very different interaction types, both reserve an active role for the peer in the interaction, either by trying to engage with the peer's thinking and entice him/her to engage with one's own thinking (deliberative argumentation) or by letting the peer lead and decide (quick consensus seeking). Interestingly, individual estimations of prior knowledge or confidence in the correctness of one's own solution did not play a role in either of these two peer discourse styles. This seems to suggest that acknowledging the contributions of a peer partner is not motivated by lower personal competence perceptions in the topic domain per se.

Across both studies, and in alignment with previous work (Sommet et al., 2015; Darnon, et al., 2006), students who endorsed performance-approach goals showed more willingness to

engage in disputative peer discourse and defend their own ideas at all cost. Both studies also showed that higher confidence in the correctness of one's own solution substantively improves the prediction of disputative argumentation. Interestingly, performance-approach goals and confidence were not correlated; each added to the prediction independently. The role of mastery goals in disputative argumentation is less clear-cut, however, as negative associations with disputative argumentation were only found in Study 2. Negative associations were also found between mastery goals and quick consensus-seeking in both studies Even though these were not predicted, the findings are in line with the rationale that a focus on learning and understanding is antithetical to a focus on defending one's own ideas in a discussion at any cost, or to a focus on reaching a quick consensus without further exploration.

Finally, endorsement of mastery goals was found to be associated with private deliberation in both studies. Higher perceived prior knowledge ratings also added to the prediction of private deliberation in Study 1, indicating that subjective perceptions of expertise may play a role in a person’s inclinations to work individually. However, even though a similar trend was detected in Study 2, it did not reach significance. More research is needed to further explore the role of perceived knowledge in private deliberation.

The findings of the present work are overall well aligned with the work on socio-cognitive peer conflict regulation (e.g., Darnon & Butera, 2007; Darnon et al, 2006; Sommet et al., 2012; 2015) and extend it by incorporating several refinements. The three refinements to the procedure were a focus on the learning of complex concepts for which students are known to have robust misconceptions (instead of easy topics that require "additive" types of learning), the inclusion of all three achievement goals for each discourse type (instead of only two at a time), and the

addition of confidence and perceived prior knowledge ratings as additional predictors of discourse behaviors.

In addition, two refinements were made to the model and measurement of socio-cognitive conflict regulation: First, we distinguished between deliberative peer argumentation and private deliberation and argued that these can and should be measured separately, as the latter does not describe a form of peer discourse, but rather an intra-mental process. The findings presented here confirm that the two styles can be distinguished and are only moderately related. For both, mastery goals play a central role, but some of our findings indicate that for private deliberation, perceived prior knowledge may play a role as well. As both styles involve deliberative processes, openness to different ideas and rethinking one's own understanding, it could be argued that they are perhaps equally beneficial for learning, but that some students prefer private reflection over its peer-to-peer counterpart. It is also possible that some students view it as a preparatory phase, prior to entering a peer discussion. More research is needed on private deliberation in peer argumentation settings, both to explore additional antecedents of private deliberation (e.g., overtness or social goals), as well as to compare effects on learning gains.

Finally, the assessment of quick consensus seeking was slightly different from how the construct of protective social regulation has been measured in previous work (e.g., Sommet et al., 2012; 2015): The survey items used in this study specifically focused on the behavioral components of quick consensus seeking and the wish to avoid confrontation, without reference to the subjective estimations of the peer's (superior/inferior) understanding. Estimations of prior knowledge and confidence about the correctness of one's own explanations were measured separately. In spite of this difference, findings from these two lines of research are overall well-aligned, with both emphasizing the role of performance-avoidance goals.

A few minor incongruences stand out, however, and require some further attention. In Sommet et al.'s studies, performance-avoidance goals were associated with more protective social regulation *only* when the peer partner was perceived as relatively more competent than the target student (Sommet et al., 2012; 2015) or when his or her competence was unspecified (Sommet et al., 2015, Study 3). They were not associated when the peer was defined to be of equal competence, however. In the present work, however, performance avoidance goals predicted quick consensus seeking with a peer of equal competence. Moreover, even though the current study did not include separate measures of *relative* competence, it did include their subjective confidence and prior knowledge ratings, neither of which was found to contribute to the prediction of quick consensus-seeking. This incongruence may perhaps be attributed to the subtle differences in the ways in which protective social regulation (which includes references to the partner superior competence) and quick consensus seeking (which does not) are measured each. It would be interesting to examine whether the Sommet et al findings about the role of comparative peer competence in protective regulation could be replicated when explicit references to the peer's superior competence are omitted from the way the latter (protective regulation) is measured.

A word of caution is warranted, however, as neither the quick consensus seeking scale nor the protective regulation scale showed satisfactory internal consistency reliability (around .6). In spite of the convergent findings from these two separate lines of investigation, they should be treated with the necessary caution, at least until future replications with more reliable assessment tools are available.

In contrast to the findings about achievement goals, the expectations regarding gender differences in discourse styles were not confirmed, as the results did not reveal a clear and

consistent pattern. Gender differences on mean discourse style scores were only found in two separate instances: Females reported on more deliberative argumentation in Study 1 and male students on more private deliberation in Study 2. Even though both findings aligned with theory and hypotheses, neither was replicated in the other study. Moreover, and contrary to expectations, no gender differences were found on quick consensus seeking or disputative argumentation in either sample. Based on the findings presented here, it is therefore not possible to draw any clear conclusions regarding the potential role of gender in these four discourse styles. It has been argued that gender differences in interpersonal interaction behavior emerge most clearly during actual interactions (Maccoby, 1998). Thus, the lack of consistent patterns of gender-specific differences in discourse styles may perhaps be due to the use of self-report measures, instead of objective measures of actual discussion behavior. Research that compares actual discourse styles of male and female students with a disagreeing peer should provide further insight in this matter.

Limitations and future research directions

In addition to the aforementioned, we would like to highlight several additional limitations and directions for future research: First of all, the PADS discourse style scales offer insight into students' self-reported intent to engage in a particular discourse type, given a specific situation. Even though these intentions are assumed to play a major role in actual discussion behavior with a disagreeing peer, they should not be equated with one another without further empirical work exploring this role. A few studies have included actual interaction behavior. However, with a few notable exceptions (Asterhan & Babichenko, 2015; Felton et al., 2015; Sommet et al., 2015, study 4), these have either relied on post-interaction, self-report questionnaires, instead of analyses of the actual peer interaction (Darnon & Butera, 2007; Darnon, Butera & Harackiewicz,

2007; Sommet et al., 2012, study 3), or did not allow for extended communication, but only included measures of students' one-off response to a fictitious disagreeing peer (e.g., Darnon, Muller et al., 2007, study 2; Darnon, Harackiewicz et al., 2007, study 2). Even though the overall findings from these studies are in line with expectations and therefore encouraging, more research is needed that includes detailed analyses of actual, extended peer interaction. Among others, it is likely that the effects of goals wane off as the discussion progresses and that goals are shaped by the peer partner's behavior and other situational factors (e.g., Asterhan & Babichenko, 2015).

Second, even though the definitions of argumentive discourse types rely on previous work that has examined the relation between discourse types and learning effects, this was not tested directly in the current work. Future research should ideally examine multiple relations in one study design: (1) how individual differences (e.g., in achievement goals, gender) and task design features (e.g., instructions, task difficulty) determine situational discourse goals; (2) how these situational discourse goals, in turn, affect actual discussion behavior in a given situation; and (3) how actual discussion behavior is associated with learning outcomes.

Third, it is possible that in actual learning tasks, some of the predictive variables explored in the current study would interact with one another, thereby exerting a potentially different effect on actual interaction behavior. For example, in the current study, prior knowledge and achievement goals were measured independently and found to each add to the prediction of disputative argumentation. In an actual learning task, subjective evaluations of one's knowledge or expertise in a topic domain could interact with the type of goal that person chooses to pursue in a task.

Fourth, the studies reported here did not include additional variables that could be associated with differences in discourse style preferences. For example, prior research has found that extraverts tend more toward adversarial styles (Nussbaum & Bendixen, 2003). Future research into the enablers and inhibitors of productive argumentation should preferably include a combination of antecedents to take into account potential overlap between them and determine the unique contribution of each. This may also uncover potential interaction effects between gender and other variables, such as, for example, personality traits. Also, even though some headway has been made regarding achievement goals, future research could expand to include additional motivational constructs that are potentially relevant to peer argumentation, such as students' belief about effort and intellectual competence (Dweck, 1999) and their perceptions of who has a right to speak (Clarke, 2015).

Finally, the samples in the two studies presented here were predominantly Jewish and from a specific country (Israel). Some aspects of Jewish and/or Israeli culture may promote more dialogic practices and dispositions (e.g., Schwarz, 2015). Replications in other cultural contexts are then recommended to examine whether the same results are achieved. For example, it is possible that mastery goals might have a weaker association with deliberative argumentation in cultures where probing and challenging are valued less and avoidance of any social conflict is valued more.

Conclusion

The current work contributes to ongoing research efforts that explore potential inhibitors and facilitators of productive peer argumentation in learning settings, by focusing on achievement goals and gender. Building on and refining previous work on socio-cognitive regulation, a self-report tool for the assessment of different argumentive discourse styles was

developed to distinguish between deliberative argumentation, disputative argumentation, quick consensus seeking and private deliberation. These different discourse styles were each predicted by different achievement goals, and, in some cases, by individual difference in confidence and knowledge perceptions, but no consistent relations with gender were found. Based on these and previous findings, we conclude that achievement goals are a potentially potent factor that should be taken into account when creating the conditions and settings for productive peer argumentation in educational settings.

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Table 1.

PADS survey items and their correlating constructs

Construct	*PADS items*
Deliberative argumentation	1. I try to understand why my partner believes my answer is wrong
	2. I try to collaboratively examine each idea critically with my partner
	3. I try to have my partner explain his/her ideas to me more precisely
	4. I try to think together about what could be the best answer
Disputative argumentation	5. I try to defend my own explanation at any price
	6. I try to show my partner why s/he is wrong
	7. I try to prove him/her that I am right
	8. I try to hold on to my own initial standpoint
Quick consensus seeking	9. I try to avoid any confrontation between myself and my partner
	10. I prefer that other leads the discussion and develops his/her solution
	11. I try to reach an agreement as fast as possible
	12. I would prefer to concede and terminate the discussion quickly
Private deliberation	13. I re-examine my ideas independently and by myself
	14. I try to consider the differences between the answers by myself
	15. I prefer to re-think my solution independently before my next move

Table 2.

Pearson correlations between the different Study 1 variables and their respective means (and SD)

	1	2	3	4	5	6	7	8	9
1. Mastery goals		.20*	.09	.08	.12	.33**	.15*	-.11	.30**
2. Performance approach goals			.31*	-.08	-.05	.10	.21**	.10	.15*
3. Performance avoidance goals				-.03	-.05	.16*	.04	.18**	.05
4. Confidence					.43*	-.05	.32**	-.06	.06
5. Perceived domain knowledge						.01	.22*	.06	.21*
6. Deliberative argumentation							-.07	-.11	.28**
7. Disputative argumentation								.04	.11
8. Quick consensus seeking									.10
9. Private deliberation									
M (SD)	5.48 (1.13)	4.23 (1.44)	4.31 (1.24)	2.33 (.86)	2.51 (.80)	5.30 (1.12)	3.61 (1.29)	3.50 (1.15)	4.44 (1.21)
Cronbach's α	.87	.89	.71	-	-	.80	.82	.63	.65

* $p < .05$, ** $p < .01$

Table 3.

Results from hierarchical regression analyses for predicting 4 types of argumentive discourse style in Study 1 (N = 231)

	Deliberative argumentation			*Disputative argumentation*			*Quick consensus seeking*			*Private deliberation*	
	β^a	β^b		β^a	β^b		β^a	β^b		β^a	β^b
Step 1											
Mastery	.32****	.33****		.11	.07		-.14*	-.14*		.28****	.26***
Performance-approach	.02	.01		.20**	.23***		.08	.08		.10	.10
Performance-avoidance	.13*	.13*		-.03	-.03		.17*	.17*		-.01	.00
Step 2											
Perceived knowledge		.05			.10			-.09			.20***
Confidence		-.09			.29****			.09			-.04
R^2	.13****	.13****		.06***	.17****		.05**	.06*		.10****	.13****
ΔR^2		.01			.11****			.01			.04*

[a] For models including variables in step 1. [b] For models including all five variables.

* $p < .05$, ** $p < .01$, *** $p < .005$, **** $p < .001$

Table 4.

Mean (and SD) scores for argumentive discourse style among male and female students in Study 1

	Male *(N = 87)*	*Female* *(N =145)*	
Deliberative argumentation	5.12 (1.17)	5.41 (1.08)	$t(230) = 1.87$, $p = .032$, $d = .25$
Disputative argumentation	3.61 (1.26)	3.59 (1.26)	$t < 1$
Quick consensus seeking	3.27 (1.13)	3.23 (1.07)	$t < 1$
Private deliberation	4.52 (1.14)	4.39 (1.26)	$t < 1$
Confidence	2.45 (.89)	2.21 (.85)	$t(232) = 2.13$, $p = .034$, $d = .30$
Perceived knowledge	2.59 (.87)	2.49 (.75)	$t < 1$

Table 5.

Pearson correlations between the different Study 2 variable as well as their means (and SD)

	1	2	3	4	5	6	7	8	9
1. Mastery goals		.20*	.03	.21*	.20	.67**	-.37 *	-.22*	.35**
2. Performance approach goals			.33**	-.06	-.06	.06	.20	.10	.16
3. Performance avoidance goals				-.13	-.12	-.04	.19	.21*	.14
4. Confidence					.68**	.11	.14	-.22*	.13
5. Perceived domain knowledge						.18	.10	-.28**	.16
6. Deliberative argumentation							-.33**	-.15	.48**
7. Disputative argumentation								.18	.16
8. Quick consensus seeking									.04
9. Private deliberation									
M (SD)	4.61 (1.80)	4.16 (1.47)	4.05 (1.39)	2.44 (.94)	2.48 (.80)	4.60 (1.49)	4.06 (1.58)	3.69 (1.37)	4.39 (1.37)
Cronbach's α	.94	.88	.67	-	-	.84	.87	.60	.77

* $p < .05$, ** $p < .01$

Table 6.

Results from hierarchical regression analyses for predicting different argumentive discourse styles in Study 2 (N = 96)

	Deliberative argumentation		*Disputative argumentation*		*Quick consensus seeking*		*Private deliberation*	
	β[a]	β[b]	β[a]	β[b]	β[a]	β[b]	β[a]	β[b]
Step 1								
Mastery	.69****	.69****	-.42****	-.49****	-.24*	-.19[1]	.34***	.31***
Performance-approach	-.06	-.06	.24*	.25**	.05	.04	.05	.06
Performance-avoidance	-.04	-.04	.12	.16	.29**	.27*	.12	.13
Step 2								
Perceived knowledge		.13		.07		-.20		.10
Confidence		-.12		.23		.09		.02
R^2	.46****	.47****	.23****	.30****	.12**	.14**	.15***	.16**
ΔR^2		.01		.08**		.04		.01

[a] For models including variables in step 1. [b] For models including all five variables.

1 $p = .053$, * $p < .05$, ** $p < .01$, *** $p < .005$, **** $p < .001$

Table 7.

Mean (and SD) scores for argumentive discourse style among male and female students in Study 2

	Male *(N = 47)*	*Female* *(N =51)*	
Deliberative argumentation	4.76 (1.25)	4.45 (1.67)	$t(96) = 1.03$, $p = .153$
Disputative argumentation	3.90 (1.42)	4.20 (1.71)	$t < 1$
Quick consensus seeking	3.59 (1.31)	3.53 (1.15)	$t < 1$
Private deliberation	4.74 (1.22)	4.07 (1.43)	$t(96) = 2.48$, $p = .008$, $d = .50$
Confidence	2.73 (.86)	2.16 (.93)	$t(96) = 3.23$, $p = .001$, $d = .64$
Perceived knowledge	2.78 (.87)	2.20 (.61)	$t(96) = 3.88$, $p < .001$, $d = .67$

Figure captions

Figure 1

The Study 1 discussion question: "Is it dark or light on the moon location from which this picture of the earth is taken?"