

# **RELATIONSHIP CONFLICT AND FEELING COMMUNICATION IN DESIGN TEAMS**

By

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## ABSTRACT

Collaborative design team members use feeling language in their communications with one another, dubbed *feeling communications*, as they negotiate their interpersonal relationships and task, process and relationship conflict to achieve successful outcomes. In this paper, we examine the use of feeling communications by design teams in a new product development class at UC Berkeley, how their use of feeling communications relates to the levels of conflict experienced by the teams throughout the semester, and how both relate to team performance. From this study, it appears that high-performing and low-conflict teams tend to use high levels of feeling communications. High-conflict teams also use high levels of feeling communications, but often suppress its use when given feedback on their process. Medium-conflict teams appear to initially produce less feeling communication, but build up to a normal level over the course of the project. These results are based on our study of 1,926 messages sent by 13 teams in the Fall 2008 class, and present promising avenues for further exploration.

## ACKNOWLEDGMENTS

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# 1 INTRODUCTION

Design is widely recognized as a social process that is particularly challenging because it requires integrating customer/client/user needs, open-ended problem-solving, creative and analytical thinking, constraints and often stressful deadlines (e.g., [1]-[2]). Kleinsmann describes the social processes of *collaborative design teams*, in which the multidisciplinary aspects become especially pertinent as team members disclose their individual knowledge and work to create shared understanding about both the design process and design content ([3] as cited in [4]). The success of the team, however, hinges on the interpersonal relationships involved in the collaborative design process ([5], [6]) and in particular on the development of trust among the team members [7].

Though team dynamics are not a new subject of inquiry (see e.g., [8], [9], etc.), work still remains to be done on how team dynamics affect design team outcomes, both in terms of project success and the team's desire to work together again. It is unclear what an optimal amount of conflict for a design team is, or the best ways for teams to productively manage their conflict. Methods for detecting and responding to unproductive conflict, while still harnessing the innovative effect of productive conflict are needed. In this paper we begin to explore whether it is possible to track the status of a team's emotional state via the use of feeling words in design documents, potentially allowing early intervention to manage that conflict – either increasing or decreasing it -- by instructors or managers.

Emotions, feelings and the use of feeling words are defined by Davidson et al. [10] as “*Emotion* refers to a relatively brief episode of coordinated brain, autonomic, and behavioral changes that facilitate a response to an external or internal event of significance for the organism. *Feelings* are the

subjective representation of emotions. Note that they can reflect any or all of the components that constitute emotions.” We define *feeling language* to be any use of words that identify a feeling. A *feeling communication* is a communiqué that includes feeling language. An example from the study is the statement, “hahaha, totally loved it, thanks for sharing the vid!” where the feeling word is “loved”.

This paper, as well as future work stemming from these preliminary results, will explore the relationships between design teams’ use of feeling communications and various measures of success.

## 2 RELATED WORK

Kleinsmann and Dong [4] found a correlation between the expression of emotional states and knowledge creation in a design session. We are interested in exploring whether this can be detected by something as simple as the use of feeling language, whether the correlation is observable over a semester-long project and if there is a relationship between design team success and the expression of emotion.

Conflict can be either functional or dysfunctional [11]. Generally, there are three types of conflict: task conflict, process conflict, and relationship conflict.

Most functional conflict is *task conflict* [11] – conflict that focuses on how a goal should be achieved, or what the goals should be. It includes disagreements over ideas and opinions about the task. By definition, task conflict is free of strong negative interpersonal emotions (e.g., anger), though personal excitement and animated discussions may occur [6].

The second type of conflict commonly found in groups is *process conflict*. Identified by Jehn [9] when she found that team members conducted conflict discussions of task planning and resource allocation separately from discussions of task-content and goals, process conflict focuses on the

means of task accomplishment, or on “who does what”, as opposed to on the ends (the focus of task conflict) [9]. Process conflict can be either functional or dysfunctional, though Jehn [9] found it was more often detrimental to group performance as task completion took longer while group members argued intensely about who should do what. Process conflict also created uncertainty in some members, who then developed a desire to quit or switch groups. Both team member turnover and withdrawing behaviors (i.e., missing meetings, or wasting time) of members who would like to leave but do not [12] can be disruptive to the other members and negatively affect team performance and cohesiveness.

The third and final type of conflict generally recognized in groups is *relationship conflict*, also called affective conflict. Relationship conflict includes all personal issues such as personality conflicts, negative feelings toward teammates and differences in value systems. This type of conflict is typically highly emotional and disruptive. Amason [11] found it to be negatively correlated to decision quality and affective acceptance of group decisions, and Bayazit and Mannix [12] found that relationship conflict significantly predicted members’ intent to remain in their teams.

Though groups may want to encourage task conflict at certain times in their project, there is evidence that task and process conflicts may lead to the development of relationship conflict [6] when team members misconstrue the conflict as personal, or bring in strong emotions to try to defend their point of view. And though even top performing teams display some level of relationship conflict, especially as hard deadlines approach [9], it should be minimized as much as possible.

Jehn and Mannix [6] looked at conflict in teams over time, and found that high-performing teams had an increase in task conflict during the middle phase, and moderately low task conflict during the first and final phases, while low performing teams had moderately low task conflict in the

first and second stages and high task conflict in the final stage. Both types of teams had an increase in relationship conflict in the third stage, with low-performing teams having significantly more. Though both types of team had process conflict toward the end, only the low-performing groups had a fair amount in the beginning.

Previous design researchers have used computational tools to analyze design team communication. Hill et al. [13] used latent semantic analysis techniques to analyze design team email archives, along with other team documents to determine the level of semantic coherence among team members as a measure of the shared understanding in the team. This led to the understanding that high performing teams cycled between periods of high and low semantic coherence, but always “got on the same page” to achieve deliverables. Hill et al. speculate that customer and mentor feedback after a deliverable stimulated the individual and group rethinking that led to periods of conflicting then shared visions. Low performing teams, on the other hand, ignored or did not act on feedback as effectively.

Analyzing the same data set Valkenburg used to describe the reflective design practice [14], Kliensmann and Dong [4] investigated the effect of affect on creating shared understanding. Coding each sentence by hand, they looked at the conscious expression of emotional conflict during different design activities and found a correlation between knowledge creation activities and high affective content along with a corresponding correlation between the sharing of existing knowledge and low affective content. However, this labor-intensive method of analyzing and detecting emotional content would be difficult to use as a method to provide several design teams with timely feedback as would be desirable in educational or industry contexts.

The latent semantic analysis (LSA) approach to design communication analysis primarily detects process or task conflict, as it considers agreement or disagreement in the team understanding of the

product concept at hand. We are interested in seeing if relationship conflict can also be detected through the language used in design communication. It is easier to resolve relationship conflict if caught early on, and if there are correlations between relationship conflict and the use of feeling language we may be able to use this as an early warning tool.

### 3 TESTBED & METHODOLOGY

Our data is collected from the Fall 2008 semester version of ME 290P, “Managing the New Product Development Process: Design Theory and Methods”, a graduate-level multidisciplinary design course at the University of California at Berkeley. This class is made of a mix of graduate students from the Schools of Business, Engineering, and Information at UC Berkeley, and students from the industrial design program at the California College of the Arts in San Francisco. Although our research methodology did not include a control group or carefully measurable experimental variables, it did provide a semester-long longitudinal study of teams that resembled design teams in industry. At the beginning of the semester, the students were divided into thirteen teams based on a combination of individual student interest, distribution of disciplines available, and team size. Just as in industry, the design teams’ sizes varied from four to six members, and while all disciplines (MBA, engineering and design) were represented in the multifunctional teams, the weighting of those disciplines also varied.

The semester-long project comprised four design phases, adapted from the three design phases used by Song & Agogino [15]. Each design phase is approximately three weeks long, and is marked by a major team deliverable.

Design Phase 1 consists of the team’s initial user needs research, from team launch to the user needs analysis report (9/10/08 ~ 9/30/08).

Design Phase 2 consists of concept generation, from the final user needs to the in-class peer review of three concepts (10/1/08 ~ 10/21/08).

Design Phase 3 consists of final implementation and prototyping, running through to user testing results (10/22/08 ~ 11/17/08).

Design Phase 4 consists of the second iteration of the implementation, based on the user testing results, through to the final tradeshow (11/18/08 ~ 12/17/08).

Throughout the semester, we collected data on the teams' status and progress through a variety of measurement and data collection tools, such as email archiving and surveys. These tools collected data on the teams' electronic communications, which were then computationally processed to detect feeling language, in addition to the team's level of relationship conflict and the team performance. Details on how this data was collected and processed are presented below.

### 3.1 FEELING LANGUAGE IN ELECTRONIC COMMUNICATIONS

Each team was provided with a group email list and automatic email archive through bSpace, an online collaboration and learning environment in use at UC Berkeley. The students, mentors and instructors of ME 290P collectively produced 1,979 email messages over the course of the projects. This includes 1,926 messages produced within the duration of the semester-long class, and 53 messages produced in the weeks following the final tradeshow. For this study, only the emails sent by team members during the duration of the semester were included in the analysis.

Each email was analyzed for the use of feeling language by running it through a program that checked for any words contained in a *feeling dictionary*. The feeling dictionary was based on a list of emotions used in the Non-Violent Communication technique of conflict management [16], and then expanded with the use of a digital thesaurus and dictionary to include 791 words, all variations of

different feelings coded for positive and negative valence (see Table 1). To be included in the feeling dictionary, the base word needed to be easily identified as a feeling corresponding to an emotional state and pass the test “if I feel X, then I am X”. For example, when I feel *angry*, it must be because I *am angry*; however, when I feel *ignored*, it is not necessarily because I *am ignored*. Thus, *angry* would count as a feeling word and *ignored* would not. Noun, adverb, and adjective forms of the term were also considered. The valence of each feeling was determined by asking whether it described an emotion that occurred when a person’s basic needs were being met or were not being met. This coding schema was also taken from NVC, which divided the original lists into “feelings when your needs are satisfied” and “feelings when your needs are not satisfied” [16].

Some words were removed that could be used either as a feeling word or not. For example, one word that was initially used and then removed after an initial run was "competitive". Though “competitive” may be used as a feeling word (e.g. "I feel competitive with Jane"), it was often used instead as reference to an assignment (e.g. "please conduct a competitive analysis"). Competitive was the only word that stood out, but it’s possible other words with lesser impact (i.e., less frequent use) made it into the dictionary and that some words were left out. Removing “competitive” provided a clearer pattern of results than initially found.

After a message was identified as containing a feeling word, it was classified as being a positive-, negative-, or dual-valenced message (Table 1). The analysis program checks for feeling word use, not expression of emotion. This provides us with descriptive data, which will hopefully reveal patterns worth further investigation. For more details on how this methodology can be refined, see the future work section.

TABLE 1. DISTRIBUTION OF VALANCED FEELINGS.

Negative Feelings	Positive Feelings	Total Feelings
462	329	791

### 3.2 RELATIONSHIP CONFLICT

Because relationship conflict pertains to interpersonal issues and challenges, it seems natural to think that teams with higher levels of relationship conflict might use more feeling communications to express and explore those issues. However, it seems equally plausible that a team with a primarily avoiding approach [17] to conflict resolution may do the opposite and use fewer feeling communications. Therefore, we hypothesize that *there is a positive correlation between relationship conflict and the use of feeling communications.*

Relationship conflict was measured using the results of midterm and final team feedback surveys. Midterm surveys were conducted at the end of phase two, when the students had a Concept Prototype and Design Review Tradeshow (~10/1/2008). The final survey, almost identical to the midterm survey, was sent out between the end of classes (12/10/2008) and the final tradeshow (12/18/2008).

In both surveys, students were asked the same set of questions to measure how well team member relationships were going. The students were asked to state their agreement with the following statements, derived from a model of executive teams developed by Passages Consulting circa 2006, based on work by Carlos Rivero [18]:

- We are respectful of each other's differing views and opinions.
- We engage each other in generating new ideas.
- We draw everyone in to the group conversation; no one is left out
- There is trust amongst the team that we will each honor our commitment.
- The team enjoys working together.
- We address conflicts effectively (vs. avoid them or get derailed by them)
- We give each other constructive feedback as needed.

Students were asked to rate each question from one (low) to seven (high) based on their level of agreement with the statement presented. Scores were then calculated by averaging the responses of the team members. Teams were ordered by score and assigned a “high”, “medium” or “low” conflict ranking by first breaking the teams into approximately thirds and making adjustments based on obvious disparities between scores and teaching team perceptions.

### 3.3 TEAM PERFORMANCE

A team’s success can be measured on two criteria: how well the team members work together, reflecting the social process, and how good their product is. Because the ultimate goal of product development teams is to produce successful products, it’s important to learn what factors lead to that success, and therefore we are interested in knowing if there is a relationship between the quality of the team’s work and their use of feeling communications. Based on Jehn’s work, an increase in relationship conflict correlates with a decrease in team performance. If we theorize a positive correlation between relationship conflict and feeling communications, we then hypothesize that *there is a negative correlation between design team performance and the use of feeling communications*.

Team performance is based on each team’s final project grade in the class. Project grades were given as a team, and were based on two parts. The first part, assessed by the faculty, was the quality of the team’s work on project related assignments and intermediary deliverables. The second part, assessed by a panel of industry judges, looked at the quality of the team’s final project presentation and deliverables.

Due to the way grades were assigned, the teams received one of five grades. The top two tiers contained three teams combined and they were ranked as “high performing”. The four teams that fell into the lowest tier were ranked as “low performing”, and the remaining six teams were ranked as “average”.

## 4 RESULTS AND DISCUSSION

Table 2 summarizes the teams (renamed for confidentiality), the total volume of email messages sent by the team members, the midterm and final relationship conflict levels of the team, and the team's final overall performance.

As would be expected given previous research on relationship conflict and team performance, there is a fair amount of overlap between the high-performing groups and the low-conflict groups, as well as an overlap between the low-performing and high-conflict groups. Team M is an exception to the trend with high conflict, and high performance, but it is also the most prolific of the teams. Team L was low-conflict and low-performing, which is also an exception. It is interesting to note that this was the only all-male team in the class.

TABLE 2. SUMMARY OF TEAMS' EMAIL VOLUME, RELATIONSHIP CONFLICT LEVEL, AND FINAL PERFORMANCE. TEAMS WITH LESS THAN 50 EMAILS (IN ITALICS) ARE EXCLUDED IN THE FEELING LANGUAGE ANALYSIS.

TEAM	# OF MESSAGES	MIDTERM CONFLICT	FINAL CONFLICT	TEAM PERFORMANCE	# OF MEMBERS
A	172	Medium	Medium	Low	5
B	99	High	High	Low	6
<i>C</i>	<i>14</i>	<i>Medium</i>	<i>High</i>	<i>Low</i>	<i>5</i>
D	61	Medium	Low	Average	4
E	179	Low	Low	High	4
<i>F</i>	<i>26</i>	<i>High</i>	<i>Medium</i>	<i>Average</i>	<i>5</i>
<i>G</i>	<i>21</i>	<i>Medium</i>	<i>Medium</i>	<i>Average</i>	<i>6</i>
H	245	Low	Low	High	5
J	89	High	High	Average	6
<i>K</i>	<i>36</i>	<i>High</i>	<i>Medium</i>	<i>Average</i>	<i>6</i>
L	117	Low	Medium	Low	5
M	384	Medium	High	High	6
<i>N</i>	<i>22</i>	<i>Low</i>	<i>Medium</i>	<i>Average</i>	<i>5</i>

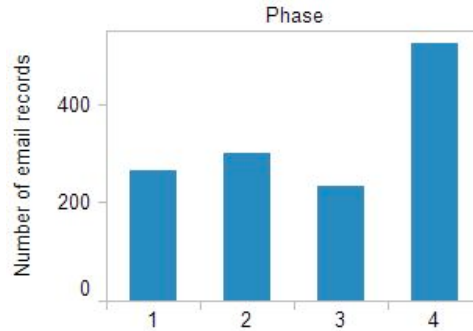
Prior research has shown that even high-performing teams tend to have an increase in relationship conflict toward the end of a project when deadlines loom [6]. In our dataset, the majority of teams maintained (six teams) or increased (four teams) their level of perceived relationship conflict as measured by the midterm and final term surveys. Three teams, however, lowered their conflict. Two groups, Teams F and K, moved from high to medium conflict, indicating they were able to work out some of their issues. The third team, Team D, moved from medium to low conflict, but though the entire team reported on the midterm survey, only half of the team reported on the final survey; its change in relationship conflict could easily be a bias due to low sampling of the second data point.

#### 4.1 FEELING LANGUAGE BY DESIGN STAGE

Although email aliases were provided, not all teams opted to use the aliases as their primary mode of communication. For example, Team C experienced some initial difficulties with its alias, and stopped using it within the first design stage. It is interesting to note that three of the five teams that did not use the aliases were “under watch” by the teaching team by the middle of the semester, which means the instructors were concerned that they would not be able to successfully complete their project.

Teams with fewer than 50 total emails for the semester were excluded from this study because, as with Team C, these teams conducted the bulk or all of their intra-team communication outside the provided mail system. Our analysis focused on the remaining eight teams: Teams A, B, D, E, H, J, L and M. Figure 1 shows the distribution of email communication by these eight teams across design stages. The fourth stage has significantly more email than the others (about twice as much), which is likely a reflection of the teams scrambling to coordinate the final implementation of their projects. We did not filter out emails by content type (e.g., coordinating emails such as “Can we

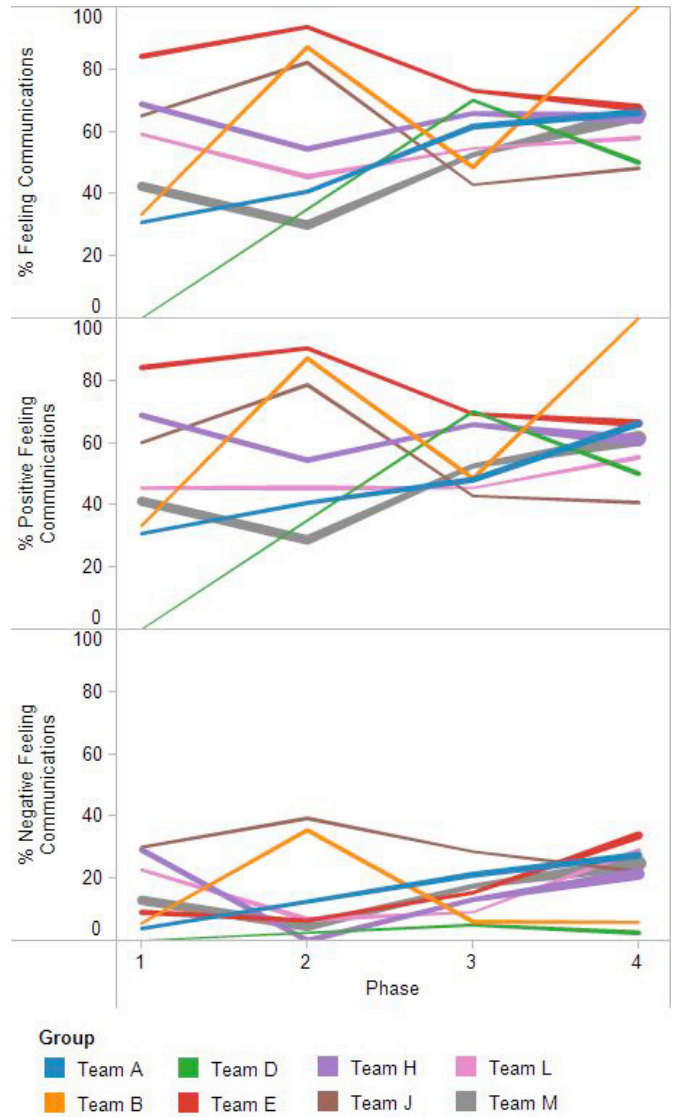
meet at 5pm today?”), which would affect this count, as we are currently looking at feeling messages as a percentage of total team communication as opposed to how the feeling language was used.



**FIGURE 1. TOTAL VOLUME OF EMAIL BY PHASE FOR THE EIGHT TEAMS ANALYZED.**

Figure 2 displays the usage of feeling language by team as a percentage of total messages sent (top chart), broken down into positively valenced feeling messages (middle chart) and negatively valenced messages (bottom chart). Varying line thickness represents email volume. Despite the varied levels of feeling communications across the teams during earlier phases, almost all teams converged to about 60-65% feeling messages in the fourth stage. This may simply be due to the larger volume of email in the fourth stage; we could hypothesize that 60-65% feeling communications is constant across all design stages when provided enough volume of communication for study. As we can see in Figure 3, the percentage of feeling messages the class sent as a whole did not vary much between phases, which supports this hypothesis.

Though the feeling dictionary contained more negative words than positive words, negative terms were used much less often. Table 3 lists the top ten negative and positive feeling words in intra-team communications. The analysis done here focused on feeling word use rather than the expression of emotion, so the results may be skewed. For example, the word “good” is often used in an evaluative rather than expressive capacity.



**FIGURE 2. USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCED FEELING MESSAGES (BOTTOM), POSITIVELY VALENCED MESSAGES (MIDDLE), AND ALL MESSAGES THAT CONTAIN FEELING LANGUAGE (TOP). LINE THICKNESS REPRESENTS EMAIL VOLUME.**

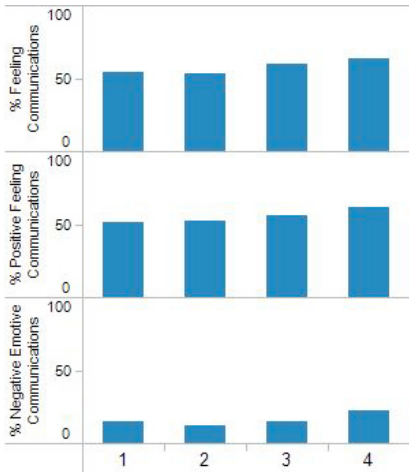


FIGURE 3. PERCENT OF EMAIL COMMUNICATIONS CONTAINING FEELING LANGUAGE (TOP), POSITIVE FEELING LANGUAGE (MIDDLE), AND NEGATIVE FEELING LANGUAGE (BOTTOM) FOR THE CLASS AS A WHOLE.

TABLE 3. TOP TEN INSTANCES OF POSITIVE AND NEGATIVE FEELING WORDS IN INTRA-TEAM COMMUNICATIONS.

Negative	Instances	Positive	Instances
Worried	46	Good	825
Alarming	35	Hope	321
Worry	31	Happy	214
Confused	22	Interested	141
Longs	15	Clear	131
Concerning	15	Interesting	125
Pain	15	Love	125
Concerned	13	Hopefully	122
Confusion	13	Grateful	108
Hate	12	Care	89

## 4.2 FEELING LANGUAGE AND RELATIONSHIP CONFLICT

Because most teams followed the relationship conflict pattern found by Jehn & Mannix [6], we decided to look at teams based on their midterm levels of relationship conflict. Each level of conflict seems to have a distinct pattern. Low- conflict groups tended to have a larger percentage of feeling communications throughout the project.

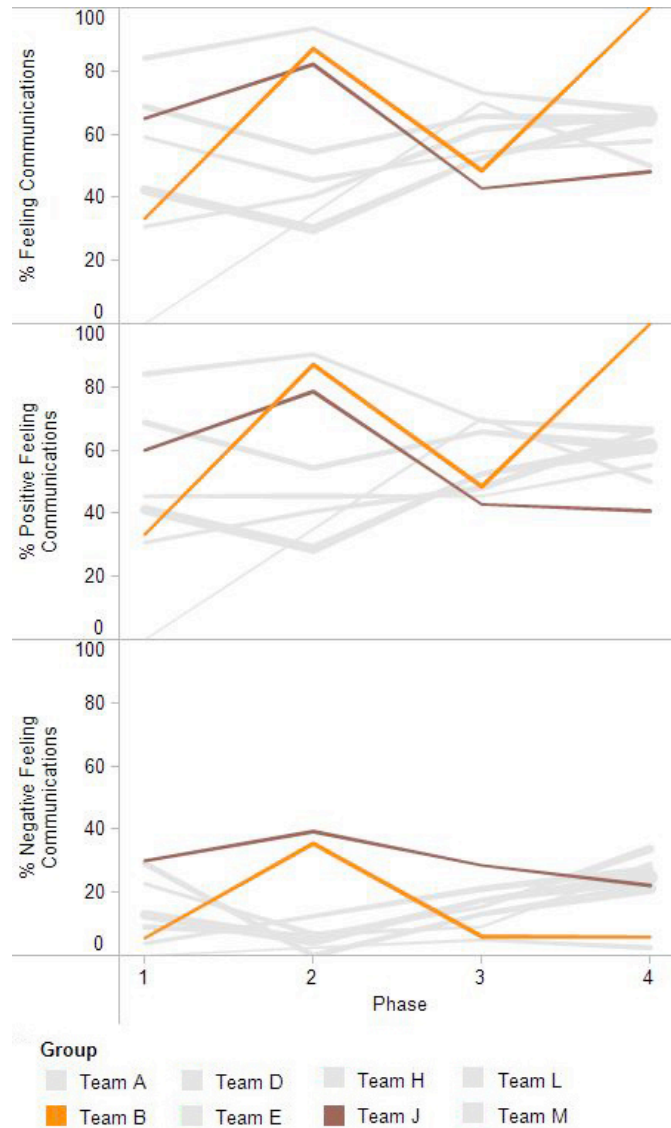
There is a dip after the second phase in the high conflict teams after an initially high level of feeling communication, with a decrease in both positive and negative language, as shown in

Figure 4. . HIGH-CONFLICT TEAMS - Usage of feeling language, as percentage of total messages sent, broken down by negatively valenced feeling messages (bottom), positively valenced messages (middle), and all messages that contain feeling language (top). Line thickness represents email volume. Two highlighted teams, B and J, were the high-conflict teams.

4. Especially interesting is the high level of negative feeling communications by these teams in the second phase when compared with all the other teams. The end of the second phase corresponded with teams and team members receiving feedback garnered from the mid-term surveys and corresponding intervention by the teaching team. This may be due to team members suppressing their use of strong feeling language as they tried to get past their difficulties, though it could also be due to renewed team effort following the tradeshow that occurred around the same time. Both teams kept their use of negative feeling language to similar levels as other teams as they progressed into the last phase. However, Team J maintained a low level of feeling communications overall, while Team B's use of positive language increased dramatically.

Figure 5 highlights teams with medium levels of conflict. These teams appear to have been more cautious about the type of language that they used at the beginning of the project, since all measures of feeling communications begin lower than they end. These teams were particularly good about not using negative feeling language in the first phase of the project compared to some of the other teams in the class. Team D, whose relationship conflict actually dropped at the end of the semester, shows a much more dramatic change in the amount of feeling language used after phase 3 than the other medium-conflict groups. This pattern appears similar to the suppression of feeling

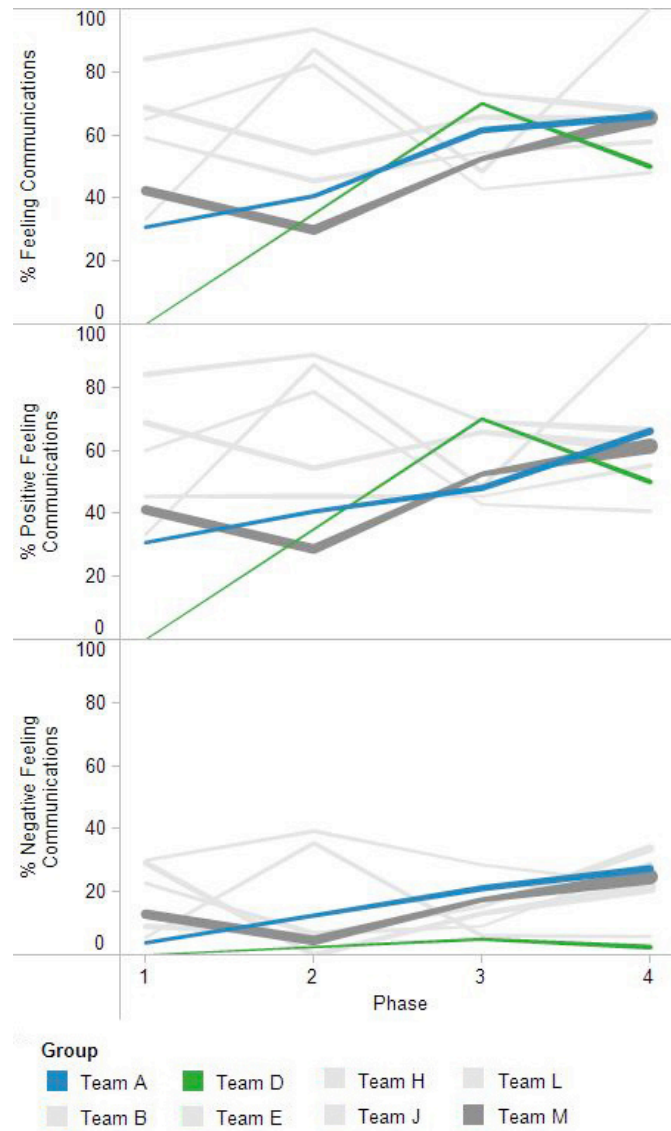
language noted in the high-conflict groups and may explain the drop in perceived conflict reported in the final survey, though they never used much negative language at all.



**FIGURE 4. . HIGH-CONFLICT TEAMS - USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCED FEELING MESSAGES (BOTTOM), POSITIVELY VALENCED MESSAGES (MIDDLE), AND ALL MESSAGES THAT CONTAIN FEELING LANGUAGE (TOP). LINE THICKNESS REPRESENTS EMAIL VOLUME. TWO HIGHLIGHTED TEAMS, B AND J, WERE THE HIGH-CONFLICT TEAMS.**

The low-conflict teams' use of positive feeling language, highlighted in Figure 6, does not show a distinct pattern. However, their use of negative feeling language dipped in the second phase, just

where the high-conflict teams' use of negative feeling language was highest. Team L's use of positive feeling language shows the unusual feature of being almost completely flat during the first three phases. At 45%, this is lower than the other teams' levels especially in the first and third phases, and begs the question whether this characteristic is related to its low performance in terms of project outcomes.



**FIGURE 5. MEDIUM-CONFLICT TEAMS - USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCE FEELING MESSAGES (BOTTOM), POSITIVELY VALENCE MESSAGES (MIDDLE), AND ALL**

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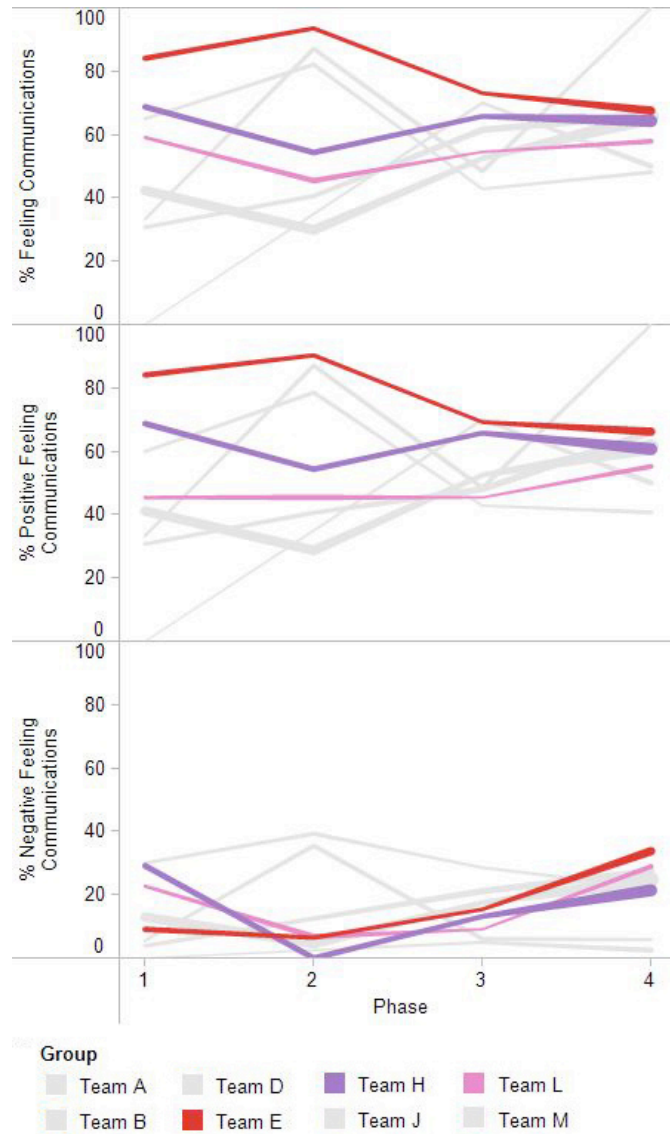


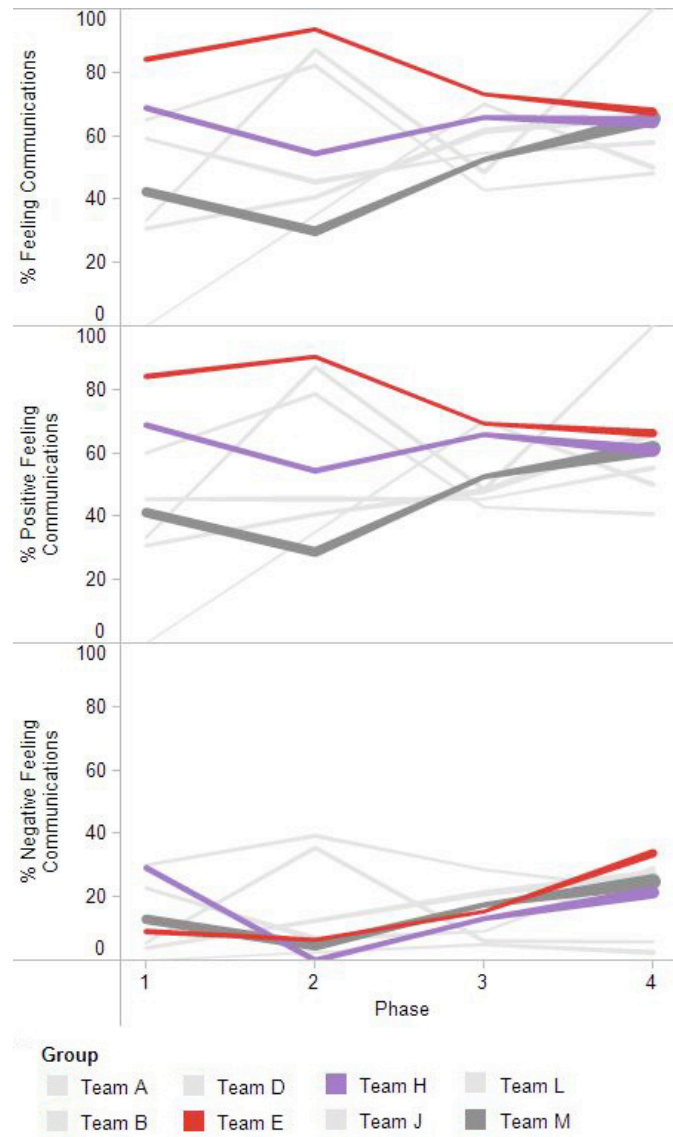
FIGURE 6. LOW-CONFLICT TEAMS – USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCED FEELING MESSAGES (BOTTOM), POSITIVELY VALENCED MESSAGES (MIDDLE), AND ALL MESSAGES THAT CONTAIN FEELING LANGUAGE (TOP). LINE THICKNESS REPRESENTS EMAIL VOLUME. THREE HIGHLIGHTED TEAMS, H, L AND E, WERE THE LOW-CONFLICT TEAMS.

### 4.3 FEELING LANGUAGE AND DESIGN TEAM SUCCESS

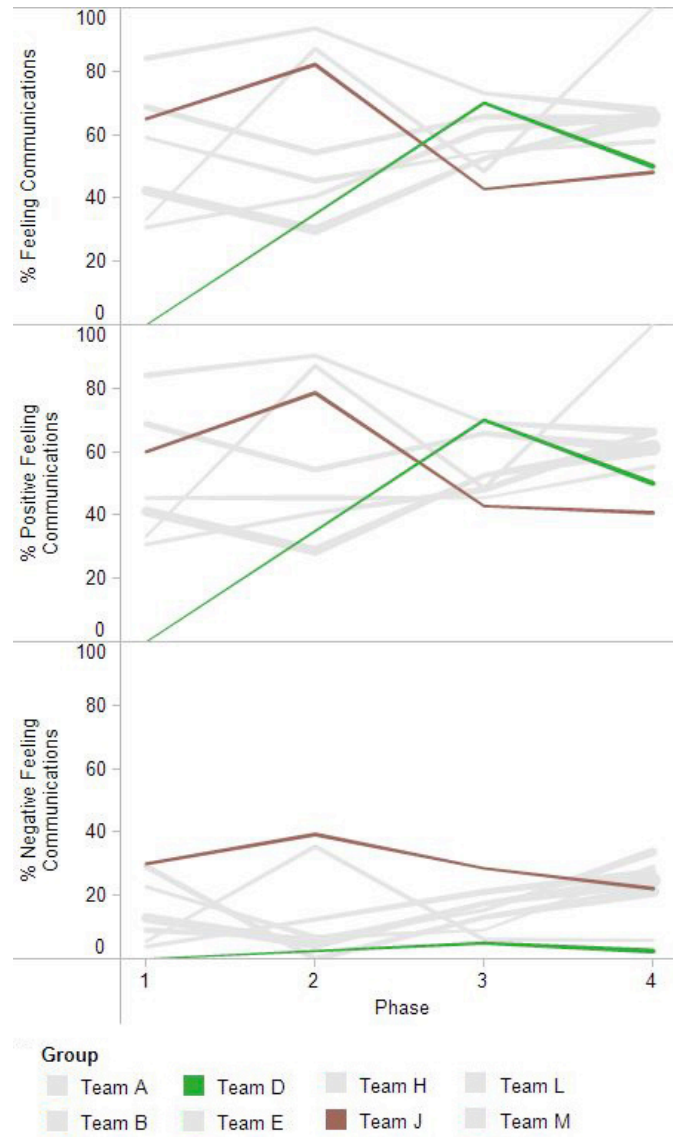
**Error! Reference source not found.**7 shows high-performing teams. The two low-conflict/high-performing teams, Teams E and H, are characterized by high use of feeling language, which corresponds with the findings of Kleinsmann and Dong [4]. The other team, which was in the medium-conflict category, is an interesting example of potential “design team divorce”. This team split into two groups – one made up of very passionate members and the other with members who were less committed to the project. At the midterm, the members of Team M expressed to the teaching team that they were hesitant to complete the midterm survey for fear that the feedback would disrupt the group’s established norm of two subgroups. This hesitancy to discuss issues head on may explain the lower use of feeling language in this group compared to the other high-performing teams. Also, Team M’s use of negative feeling language followed a similar pattern to the other teams, suggesting that low levels of negative feeling language may correlate with design team success in both team dynamics and project outcomes.

Figure 8 shows the average performing teams. Unfortunately, with only two data points, low volumes of emails in both teams, and no clear pattern it is difficult to draw any conclusions regarding this group. It is interesting to note that four of the five teams that were cut from the study due to lack of email volume were in this group, whereas three of the four highest volume teams were rated as high-performing.

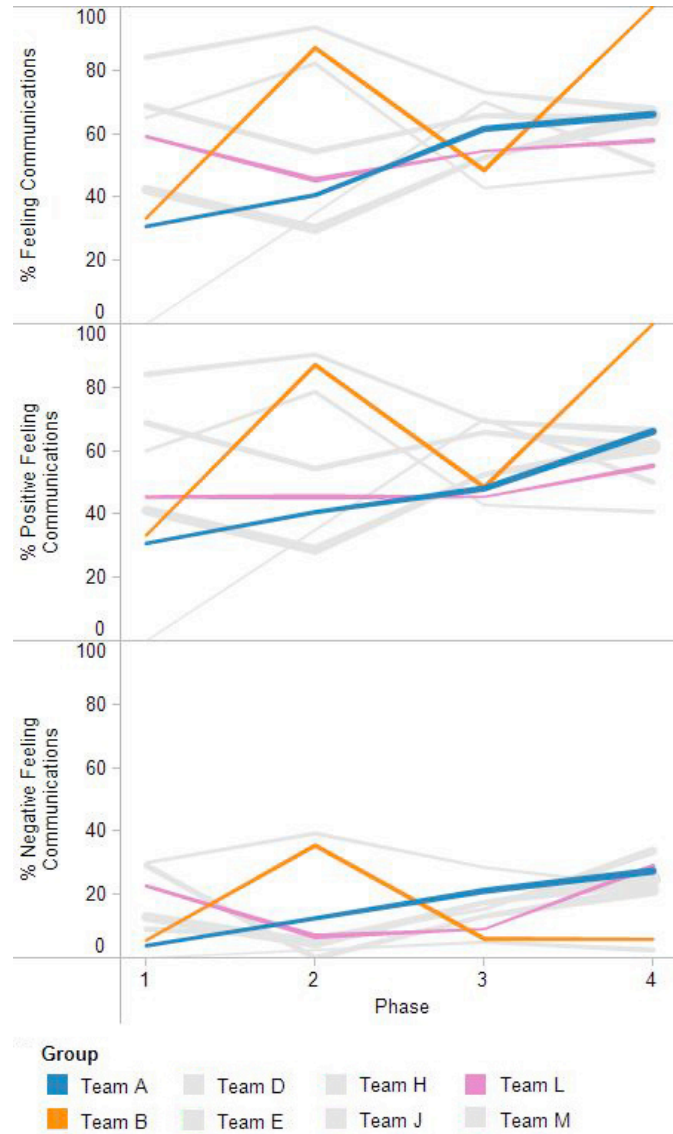
Figure 9 highlights the low-performing teams. Each of the different teams had different levels of conflict – one each rated as high-,medium- and low-conflict groups. This group seems to be the most erratic because there are large swings between the use of valenced feeling language. This shows that however successful the team is with group cohesion, it may still be unsuccessful in terms of its outputs.



**FIGURE 7: HIGH-PERFORMING TEAMS - USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCED FEELING MESSAGES (BOTTOM), POSITIVELY VALENCED MESSAGES (MIDDLE), AND ALL MESSAGES THAT CONTAIN FEELING LANGUAGE (TOP). LINE THICKNESS REPRESENTS EMAIL VOLUME. THREE HIGHLIGHTED TEAMS, H, E AND M, WERE THE HIGH-PERFORMING TEAMS.**



**FIGURE 8. AVERAGE-PERFORMING TEAMS - USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCE FEELING MESSAGES (BOTTOM), POSITIVELY VALENCE MESSAGES (MIDDLE), AND ALL MESSAGES THAT CONTAIN FEELING LANGUAGE (TOP). LINE THICKNESS REPRESENTS EMAIL VOLUME. TWO HIGHLIGHTED TEAMS, D AND J, WERE THE AVERAGE-PERFORMING TEAMS.**



**FIGURE 9. LOW-PERFORMING TEAMS - USAGE OF FEELING LANGUAGE, AS PERCENTAGE OF TOTAL MESSAGES SENT, BROKEN DOWN BY NEGATIVELY VALENCED FEELING MESSAGES (BOTTOM), POSITIVELY VALENCED MESSAGES (MIDDLE), AND ALL MESSAGES THAT CONTAIN FEELING LANGUAGE (TOP). LINE THICKNESS REPRESENTS EMAIL VOLUME. THREE HIGHLIGHTED TEAMS, A, B AND L, WERE THE LOW-PERFORMING TEAMS.**

## 5 CONCLUSIONS AND FUTURE WORK

This paper explored whether or not patterns exist between design teams' use of feeling language over the design process, the amount of relationship conflict experienced by the team and the performance of the team. As shown in the results, both hypotheses appear, at least on a descriptive level, to be accurate and call for further investigation.

High-performing design teams appear to consistently use high levels of feeling language, unless there is high conflict, in which case they suppress their use. Medium and low-performing teams' use of feeling language is much more erratic, but it would be worth investigating performance and feeling language in more depth, with a larger set of data.

Teams with high conflict levels may suppress their use of feeling language when given feedback on their process. While the instructors helped mediate many of the teams with high conflict at the midterm, some of the teams were successful in bringing their conflict levels down, and some were not. Further exploration into how coaching and instructor intervention affects the use of feeling language, and negative feeling language in particular, may help inform the timing and method of intervention.

Low-conflict teams use high levels of feeling language over the course of the project. Further research into the relationship between feeling language, team conflict and team success is recommended.

The levels of conflict in this paper were determined primarily by the midterm surveys. It would be interesting to look more closely at the emotive expression of teams that change conflict levels over the course of a project, and to expand the analysis to task and process conflicts.

Data on how innovative the projects were was not available for this particular data set. We plan on collecting data on project innovation in the future, to enable comparison with Kleinsmann and Dong's findings [4]. However, we recognize that feeling language is culturally-sensitive and that international comparisons should be done with caution.

Communication content can be varied and multipurpose. In this paper, we didn't distinguish between what type of content was being communicated (e.g., coordinating messages versus pleas for work completion). Coding messages by type, and looking beyond just email messages could provide a richer understanding of how teams use language and perhaps how language affects intra-team relationships.

In this paper, we focused on trends over a set of groups. Looking at how individual team member's feeling language use contributed to a team's language use and interpersonal dynamic would help to flesh out the way language use is related to relationships.

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