



Understanding Emotion-Cognition Interplay When Processing Feedback During the Standardized Patient Debrief Sessions

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Abstract: This study examined how medical and social work students perceive and process feedback during a post-simulation debrief session. A novel methodology was employed for multimodal sentiment analysis, which consists of gathering sentiments from videos ($n=113$) by fusing audio, visual, and textual data features. Results indicate that most students expressed positive or negative deactivating emotions when reflecting on their performance. Evaluating and looking for alternatives were the most frequent reflective behaviors with few occurrences of looking forward behaviors.

Introduction

Simulation-based training augmented with team-level feedback on communication skills during debriefings are widely used in medical schools to improve skills needed for highly reliable clinician-patient interaction. Feedback in post-simulation debriefing settings is defined as the transmission of information to individual team members or the team as a whole regarding actions, events, processes, or behaviors relative to task completion or teamwork. Feedback is widely acknowledged to be central both to motivation (by promoting team efforts) and to learning due to its informational value (Gabelica & Popov, 2020).

In this study, we explored the ways in which medical and social work students perceive and process information cues contained in feedback during Breaking Bad News (BBN) debrief sessions. Constructive uptake of feedback can be “obscured by emotional static” (Chanock, 2000, p. 95), where team members’ emotions can hamper cognitive processing of feedback. This study makes two contributions. First, our multimodal sentiment analysis provides unique insights into the ways in which medical and social work students perceive and process information cues contained in feedback during debrief sessions. Feedback on crucial aspects of team interaction needs to be perceived and meaningfully processed to reach the expected benefits of improved communication. Second, we explored a multimodal system for automatic quantification and interpretation of an individual’s response when receiving feedback based on verbal and nonverbal behavior markers during the debrief sessions, such as words (speech content), head and body movements, facial expressions, tone of voice, and turn-taking. Specifically, we leveraged machine learning to build a sentiment classifier to reliably predict in near-real time students’ cognitive-emotional states when receiving feedback. Specifically, we explore two research questions:

- (1) How do medical and social work students self-reflect as well as perceive and process information cues contained in feedback during BBN debrief sessions?
- (2) Can we leverage machine learning to build a sentiment classifier, so we can reliably predict in near-real time students’ cognitive-emotional states when receiving feedback?

Method

Our research team transcribed, analyzed, and annotated 113 standardized patient simulation videos. To understand how students perceived and processed their feedback, meaningful units of analysis (i.e., phrases, sentences or series of sentences), were hand-coded using two coding schemes to affective and cognitive dimensions of feedback perception: team reflection coding scheme, and the taxonomy of academic emotions Gabelica et al., 2014; Pekrun, 2006). To code emotions, we adapted the taxonomy of retrospective outcome emotions from Pekrun’s (2006) using a combination of categorical (e.g., discrete categories such as anger, happiness), and dimensional (valence: positive or negative; activation: activating or deactivating) approaches to emotion measurement. Each student response was hence coded as: (1) positive activating, (2) negative activating, (3) positive deactivating, (4) negative deactivating. A team reflection coding scheme was adapted from Gabelica et al. (2014) to capture the degree to which team members engaged in three cognitive (reflective) behaviors: evaluating performance or strategies, looking for alternatives, and making decisions (“looking forward”).

Results

We found that a large majority of students expressed either positive (e.g., relief) or negative (e.g., disappointment) deactivating emotions when reflecting on their performance (Table 1). We found that ‘evaluating’ and ‘looking

for alternatives' were the most frequent reflective behaviors with very few examples of looking ahead reflective behaviors (Table 2). Table 3 shows with what accuracy we can predict student' sentiment using each modality vs. multimodal model.

Table 1

Distribution of emotions across students based on Pekrun's (2006) taxonomy

Sentiment	Positive deactivating	Negative deactivating	Positive activating	Negative activating
Overall	75	344	30	18
Medical student	44	178	10	9
Social work student	31	166	20	9

Table 2

Distribution of reflexivity across students based on Gabelica et al. (2014) scheme

Reflexivity	Evaluating	Looking for alternatives	Making decisions (feed-forward)
Overall	232	202	14
Medical student	124	100	10
Social work student	108	102	4

Table 3

*Performance of unimodal and multimodal classification models for negative and positive
deactivating sentiments*

	F1*-score for negative deactivating	F1-score for positive deactivating
Video features	0.49	0.41
Audio features	0.67	0.52
Text features	0.85	0.60
Combined features	0.88	0.71

*F1-score is from 0 to 9, 9 being the highest in terms of precision and recall.

Discussion and conclusion

In this study, we have identified and captured emotional and cognitive responses to team-level feedback during BBN debrief sessions using audio, visual and textual clues from video data. We have found that most of the expressed emotions were negative deactivating, and that students were mostly engaged in reflective behaviors related to their past team performance. Hence, they seemed to have missed an opportunity for 'feedforward', that is for leveraging insights about themselves for better team performance in the future. Necessary future research should address the extent to which negative deactivating emotions are related to low future-forward team reflection. This study is part of broader research with the objective of optimizing feedback delivery and reception to prepare future medical professionals to provide the best care possible to their patients.

References

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