THE EFFECT OF AFFECT: DECISION MAKING IN THE EMOTIONAL CONTEXT OF HEALTH CARE

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For many years, cognitive science assumed that rational actors would make objectively normative decisions given the time and information they had available. However, research has shown that emotion and value-based judgments can fundamentally change the way decisions are considered and evaluated. This is a greater challenge in the health care domain, particularly the emergency room where life and death decisions are made frequently and uncertainty makes optimal decision making impossible. This presentation will present medical professionals with self-awareness of how emotions may affect their own decision making and administrators with insights into how to develop safer and more error resilient processes and procedures for their Emergency Room environments.

INTRODUCTION

Naturalistic Decision Making

Models of human decision making have evolved greatly over the past decades. Originally, it was believed that models based on Bayesian probability computations described both actual and ideal decision making (Wickens, 1984). Deviations from this model were called decision making biases. However, research conducted outside of the laboratory has discovered that decision making in natural environments that are categorized by time-pressure, vague and competing goals, extreme consequences, complex information integration requirements, and uncertain information does not follow normative models (Cannon-Bowers, Salas and Pruitt, 1996), and perhaps should not (Lee, Amir, and Ariely, 2009). Deliberating in these cases can lead to attention to suboptimal criteria and adversely affect judgment. Identifying optimal solutions can be extremely time consuming in a situation with many variables and can tax the limits of human information processing capabilities.

Selecting a satisfactory solution that is not the optimal may be a better approach when time is short (Lee, Amir, and Ariely, 2009). Experts are more likely to use an unconscious pattern matching process to identify solutions that have had satisfactory results in similar contexts in the past (Randel and Pugh, 1996). For example Flin, Slavin, and Steward found that over 80% of oil industry fire officers make decisions using an unconscious pattern matching recognition-primed decision making (RPD) process. Skilled and efficient behavior occurs because of automatic processing that is further speeded through priming via expectations (Green, 2004). This can only be achieved when the decision maker has achieved expertise, defined as having a large number of templates stored in memory to match (Cohen, Freeman, and Wolf, 1996). But while the use of RPD processes may decrease the occurrence of knowledge and rule-based errors, it may increase the occurrence of skill-based errors (Croskerry, 2005). As with everything in life, there are always tradeoffs.

Similarly, it may not make sense to make immediate adjustments each time a variance is detected. There may be a minimum deviation or risk that is needed before it is worth investing time and resources to select and implement an alternative intervention (Ehret, Gray and Kirshenbaum, 2000). Each situation would merit a cost/benefit analysis (formal or informal) to determine when this threshold is reached. This would reduce the consumption of tangible resources as well as the utilization of cognitive and attentional resources when small deviations are ignored. Performance compared to expectations can be monitored at significant milestones (Shalin and Jacques, 1998) instead of continuously.

The Health Care Domain

The health care domain is further complicated by several factors. Bagnara, Parlangeli, and Tartaglia (2010) discuss several of these that increase the risk of error in hospitals. There is a hesitancy to report errors because of the litigious nature of the industry and the self-esteem and reputation tied to accuracy among doctors. Doctors also practice medicine as a craft, with significant autonomy to make exceptions to best practices. There is a higher degree of variability in the
presentation of patient cases and the kinds of errors that may occur. This leads to experimentation in treatment implementation. Nemeth and Cook (2007) suggest that the hospital be designed for resilience rather than reliability. Even with all of these additional challenges, or perhaps because of them, Patel and Arocha (2000) found that expert teams in ICUs use recognition-primed decision making processes.

Clinical teams apply a treatment protocol that worked successfully in the past and make updates as the patient responds. The increased time pressure in the emergency room leads clinicians to create a shorter list of possible hypotheses and use easily accessible tests to eliminate them one by one (Croskerry, 2002). This can lead to the use of faster rather than more diagnostic tests.

There are also competing objectives, values and tradeoffs among the clinicians, patients, and insurers. Ashton et al (2003) attribute this in part to poor communication between doctor and patient regarding values and tradeoffs. But it may reflect true differences in values, motivations, and incentives in the health care system.

**EMOTION**

Several studies have investigated the impact of emotion on human information processing, particularly in decision making. Emotion manifests along four main chronologies (Champney and Stanney, 2007). Some emotions emerge as personality traits. These are durable emotional tendencies that can manifest towards any object at any time. Moods are medium term emotional states that develop because of internal and external stimuli and can be unconsciously directed at current objects and activities while the mood persists. Sentiments are emotional states that are directly associated with a particular object or activity and emerge as long as the object is being used or activity is ongoing. These are generally formed by positive or negative usage experiences in the past. Finally, there are short term emotional bursts that are related to co-occurring stimuli that can be part of the ongoing activity or introduced from the outside. All four of these chronologies can impact perception, attention, and decision making. Their influence can be conscious or unconscious. How aware the individual is of his/her emotional state and the nature of the environmental context both have significant influences on how emotion affects information processing and behavior.

Emotion is generally defined along two dimensions. The valence is the type of emotion. Emotion is generally divided into positive (joy, satisfaction, pleasure, etc.) and negative (anger, fear, frustration, etc.) valences. Some aspects of emotions are similar for all emotion types within a category, but occasionally some significant fundamental differences emerge between emotions within the same valence. The second dimension is the emotion magnitude. This is the arousal increase caused by the emotion regardless of its valence. Minor emotions cause only small shifts in information processing while major emotions can fundamentally change the way decisions are made.

**Research on Emotion and Information Processing**

Emotion has long been thought of as a bias against accurate information processing, but recent research has shown that this is not the case (Rahman, 2009). Emotional and analytical processes interact in different combinations and with different degrees of influence depending on the needs of the environmental context (Blanchette and Richards, 2010). Emotional processes are more holistic, experiential, associative, and passive. Analytical processes are more quantitative, logical, abstract, rule-based, conscious, and reflective. Lee, Amir, and Ariely (2009) speculate that emotional processes may have evolved for domains that require fast, accurate and consistent evaluation of values-based tradeoffs. Deliberation in these contexts can focus attention on suboptimal attributes and adversely affect judgment. The more complex a decision making context, the more useful emotion may be in complementing and even governing decision making and judgment. Emotion is not a bias at all.

**Positive Emotion**

With a few exceptions, research on the positive valence tends to show similar effects for all positive emotions. On the constructive side, positive emotions tend to increase creativity, flexibility, and efficient decision making (Raddatz, Werth, and Tran, 2007). But they increase optimism and decreases risk perception (Xie et al, 2011), which can lead to overestimation of positive outcomes and underestimation of negative outcomes (Hudlicka 2010). This may occur even when the positive emotion is a personality trait or a mood that originated in something unrelated to the current activity (Blachette and Richards, 2010).

The influence of positive emotion can lead to risk-seeking behavior or risk-averse behavior depending on the context. Efficiency can lead to a focus on surface level processing and the use of heuristic shortcuts (Raddatz, Werth, and Tran 2007). It can also increase the influence of optimistic information sources, even when the quality of the evidence does not warrant such influence (Blanchette and Richards, 2010).
Negative Emotion

Some effects are universal for all negatively valent emotions, but some differ depending on the specific emotion. For example, all negative emotions cause a narrowing of attention (Pecher, Lemercier, and Cellier, 2009). This can increase the speed at which decisions are made even with a more systematic acquisition of information (Raddatz, Werth, and Tran, 2007). But it could also increase the chance of error in atypical situations or when the search is skewed towards sources that can decrease the negative emotion.

Xie et al (2011) found that negative emotions can lead to pessimistic predictions, and thus higher risk perception. But this is often more related to sadness and fear rather than anger. Anger can lead to higher risk tolerance (Hudlicka, 2010) and even the choice of destructive behaviors (Rahman 2009). Anger tends to increase decision speed while sadness decreases it (Pecher, Lemercier, and Cellier, 2009). Anger increases the certainty of judgments while sadness decreases it.

Emotion-related personality traits are also important. Hudlicka (2010) reported that trait fear and anxiety focus attention on the detection and processing of threatening stimuli at the expense of more optimistic sources. Trait anxiety is linked to a focus on failure and the selection of protective behaviors, leading to conservative decisions. Blanchette and Richards (2010) add that anxious individuals see greater risk and higher perceived cost, leading to risk aversion.

Arousal

There is much less research on the effects of emotional arousal on information processing. In general, arousal can cause mental fatigue and decrease attention and decision accuracy even as it slows down performance (Raddatz, Werth, and Tran, 2007).

But on the positive side, emotional arousal can lead to the identification of new and better solutions because emotional intensity leads to rapid selection of intuitive responses (RPD style), perhaps recruiting deep domain knowledge that can otherwise be missed. Emotion also simplifies the decision process by focusing on just a few (hopefully the most diagnostic) attributes. Lindstrom and Bohlin (2011) add that emotional arousal that emerges directly from the target context can increase attention and working memory at least until fatigue sets in.

EMOTION IN HEALTH CARE

The health care domain is one of the most emotional contexts where human factors can be applied (Bagnara, Parlangeli, and Tartaglia, 2010). The emotion stems from several sources. The most powerful one is that these decisions can involve life, death, and well-being. For providers and for patients, the quality of these decisions is critical to their emotional well-being. Providers and patients are making value tradeoffs between effectiveness likelihoods and side effect risks without really understanding either the risks, benefits, or math behind the necessary comparisons. Patients often therefore blindly follow the recommendation of a doctor who may not understand the values or desired lifestyle of the patient.

This is complicated by the long hours that health care providers often work, which increases the influence of emotion on decision making (Killgore, Balkin, and Wesensten, 2006). Sleep deprived medical providers are more likely to select risky options for treatment and take more risk during implementation of procedures. Medical decision making is also complicated by the fast pace and time pressure typical of many health care contexts such as the emergency room (Ordonez and Benson, 1997). Time constraints can cause fundamentally different decision making strategies, often using less information and with a higher tolerance for risk.

Usability factors also influence the emotion of the health care setting. Doctors report that they find their health IT systems such as patient records to be frustratingly hard to use (Van Sonnenberg, 2011). They often lack intuitive interfaces, error prevention mechanisms, clearly presented information, and basic usability flaws such as text boxes that cut off medication names because they are too short. Doctors also have increased concern that the lack of flexibility and match with their work flow will increase the chance of error and slow down their work (Reece, 2011).

The plethora of device alarms, both visual and auditory, also increases the stress of the environment. In a comprehensive literature review, the Agency for Healthcare Research and Quality (2001) found that auditory medical alarms are only recognized one-third to one-half of the time, in part because of similar acoustic parameters and in part because of the number of alarms that may be sounding at any given time. Visual alarms can divide signals between the two modalities, but must be visually attended to, taking the provider’s attention away from the patient and the procedure.

Another source of frustration comes from hard to use medical devices. Malhotra et al (2005) identified device usability flaws stemming from their design, their user interfaces, their process logic, and the difficulty of integrating multiple devices into a single environment.
Interventions in Health Care

All of this insight into how emotion affects health care decisions would be unhelpful without corresponding insights into how to improve the situation. Since emotion is often a benefit rather than a bias, the solution is not to remove emotion from the health care context but rather to leverage its benefits while mitigating its drawbacks.

When a poorly designed medical IT system or device causes frustration and distraction, the resulting emotions are always detrimental to decision making. Therefore the introduction of better usability into medical system design would be a clear and unambiguous benefit. It is no surprise that this conference has full tracks dedicated to medical devices and medical IT.

Before the provider even encounters a patient, there are many factors that may create emotions that negatively affect the decision process. Hospital administration should use management best practices to minimize this risk. The effects of factors such as shift durations, schedules, team composition, and others on fatigue and emotion have been studied. These should be considered strongly despite the tendency for cost management to be overweighted during the administrative process.

One challenge that needs to be overcome early in the treatment process is communication between providers and patients. Each treatment has a unique combination of mortality rate, morbidity rate, side effect rate(s), expense, duration of recovery, and more. Patients need to be better equipped to understand these tradeoffs when contributing to the decision making process. If this is not facilitated by the provider, the patient will go to the Internet (Sillence et al, 2007) where they may or may not get reliable trustworthy information. Unfortunately, the time providers need to invest in this discussion is not built into the normal reimbursement models used by most insurance companies. It requires a cultural shift that seems to be slowly assimilating into the health insurance domain.

Awareness about the effects of emotion and of their trait-based and transient emotions at any given time can also be a powerful tool for providers. When providers are emotionally more risk averse or risk seeking than their peers, this can be taken into account when deliberating over diagnosis or treatment. If providers take a moment to reflect on their current moods and sentiments to identify how these might be influencing their decisions can also improve the integration of these emotions. On the other hand, when time pressure prevents conscious deliberation, such as in the emergency or operating rooms, providers can be better able to direct their intuitive decisions based on the emotions they are experiencing at the time.

At the end of procedures where time pressure correctly dominates information processing, the tendency to go quickly may trail over into the post-operative stage where time is not critical. It is at times like this that providers need to consciously and attentively slow their process. This can be accomplished using techniques that have long been used in aerospace and applied to health care in Gawande (2011). Checklists force experts to consciously focus on particular factors that may have become automatic and unconscious.

Practical Takeaways

1. It is a reality in today’s healthcare environment that shifts will often be long and intense. But administrators can mitigate the negative impact of emotions by managing the duration and alignment of shift start and stop times.
2. Emotional traits and moods can also be considered when assigning personnel into teams. It would be strategic to create teams that are blended along traits such as anxiety and moods such as anger or sadness that linger from previous patients.
3. Awareness can be a powerful tool to leverage the influence of emotion on information processing. Many of the effects of emotion can be counterintuitive or difficult to consider during the time-pressured and ambiguous situations typical in health care. Basic awareness training can neutralize some of the conflicts that may arise during patient interaction.

SUMMARY

Health care is an environment where there is a stream of emotions originating from both internal and external sources. These emotions can have an unconscious but powerful impact on the decision making of medical providers. This is further complicated in time constrained subdomains such as the emergency room, operating room, intensive care units, and more. An awareness of how emotion affects decision making, both positively and negatively, can help providers and administrators develop management best practices that minimize the risk of negative consequences.

REFERENCES


Ergonomics Society 42nd Annual Meeting. Santa Monica, CA.