

Towards a model of Personality, Affective State, Feedback and Learner Motivation

Matt Dennis, Judith Masthoff, Chris Mellish

Department of Computing Science, University of Aberdeen, Aberdeen, AB24 3UE, UK
{m.dennis, j.masthoff, c.mellish}@abdn.ac.uk

Abstract. Based on a literature survey, we present a preliminary model of the relationship between personality, performance, performance feedback, emotional support, affective state, and learner motivation. We also discuss what is needed to develop a Bayesian model of these relationships.

Keywords: Personality, Motivation, Emotional Support, Affective State

1 Introduction

Our project aims to motivate learners to study more, through the use of a learning companion [8]. In particular, we are investigating how the companion should adapt its performance feedback and empathic support to learners in order to keep them motivated. We hypothesise that performance feedback and empathic support will be more effective when tailored to the learner's personality, as motivational research has shown that motivational levels depend on the individual and a 'one size fits all' approach does not work in practice [13]. So far, we have investigated how people adapt the slanting of performance feedback to a learner's personality, in particular to generalized self-efficacy [9] and conscientiousness [10]. We are currently analysing the results of a study that investigated how a learner's motivation is affected by the slanting of performance feedback, and how this depends on the learner's conscientiousness. This study raised interesting questions. We wondered whether the learner's motivation is influenced by personality directly. We wondered whether the slanting of performance feedback would influence motivation directly, or whether it would influence motivation indirectly via affective state. The Intelligent Tutoring Systems community have started investigating the relationships between feedback types, momentary confidence and learning [4, 5]. However, they do not prove a fine grained model of the relevant factors.

In this paper we investigate through a literature survey the relationship between personality, affective state, empathic support, performance feedback, performance, and motivation. First, we explain each of these concepts. Next, we construct a preliminary model showing the relationships between them. Finally, we discuss future work needed in order to turn this model into a predictive Bayesian model.

2 Concepts

2.1 Motivation

Motivation is defined as “the state or condition of being stimulated to act¹”. Many theories of motivation exist, see [13] for an overview. There are also several theories specifically about learner motivation. For example the ARCS model identifies four factors that facilitate motivation, namely the learner’s attention, the relevance of instruction to the learner (goals, past experience, learning styles), the learner’s confidence (including self-efficacy and attribution theory) and satisfaction (establishing a positive feeling towards the learning experience) [14]. A distinction is often made between intrinsic motivation (coming from oneself; doing things for personal enjoyment), and extrinsic motivation (coming from external sources, such as the need to pass) [27]. It has been argued that people have an evolved propensity for intrinsic motivation [26]. We will distinguish between the propensity for motivation (motivation in general) and momentary motivation (motivation at a particular moment).

2.2 Personality

Personality is defined as “a person's nature or disposition; the qualities that give one's character individuality²”. It affects all areas of our lives; it governs who we are and how we respond to life’s challenges. Personality is a complex area, which has led to the development of theories of personality to aid individual understanding of oneself and others [20]. These come in several forms, such as Psychoanalytic, Neopsychoanalytic, Trait, Life-span, Humanistic, Cognitive, Behavioural, Social Learning and Limited-Domain theories [20].

Trait theory is well suited to adaptation in software as it allows psychological differences to be discerned using well defined, quantifiable measures: personality traits [20]. These traits are relatively easy to identify and measure due to the prevalence of validated self-reporting questionnaires. The constructs that we use are defined below.

Five Factor Model. There are many theories which identify a set of traits; the Five Factor Model (FFM) [12] is a well-respected construct which was formed as an aggregation of many other models. The traits are **Extraversion** (I) (talkative, energetic, assertive); **Agreeableness** (II) (sympathetic, kind, affectionate); **Conscientiousness** (III) (organized, thorough, planful); **Neuroticism** (IV) (tense, moody, anxious) and **Openness to Experience** (V) (imaginative, thoughtful, having wide interests) [12, 28]. Each broad trait can be split into smaller *facets*, enabling deeper analysis.

Self-Efficacy. Self-Efficacy is defined as “the belief in one’s capabilities to organize and execute the courses of action require to manage prospective situations” [3, p2] and has been shown to be an excellent indicator of motivational level [17].

¹ Combination of Dictionary.com, Chambers Online Dictionary

² Chambers Online Dictionary

Proactivity. Proactivity is defined as “[the extent to which people] identify opportunities and act on them, show initiative, take actions, and persevere until meaningful change occurs” [7, p.439]. It combines facets from each of the traits of the five factor model and is correlated with self-efficacy [16].

2.3 Affective state

A learner’s affective state is a measure of the emotions they are experiencing at the current time. Affective states are often characterized by two dimensions: arousal (from calming to exciting) and valence (from highly positive to highly negative) [24]. Self-reporting questionnaires exist, such as the PANAS scale which measures positive and negative affect [31]. For positive affect, it uses the words: active, alert, attentive, determined, enthusiastic, proud and strong. For negative affect, it uses: afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset and distressed.

2.4 Empathic Support

Empathic support aims to encourage and reassure the learner and support the learner’s wellbeing when faced with negative affect [18]. Statements can provide reassurance (“don’t worry”), encouragement (“you’re close”, “you can do it”) and praise (“good job”). They can also acknowledge the learner’s emotional state (“I know you may be feeling anxious”) and perspective (“yes, this topic is difficult”) [22].

2.5 Performance and Performance Feedback

Performance is how well the learner has performed a learning related task. Performance feedback reflects on the learner’s performance compared to teacher expectations. Feedback can be slanted by emphasising good or bad aspects of the learner’s performance [9]. This can be achieved by omitting items (e.g., “you are behind on A and ahead on B” versus “you are behind on A”), and by changing the phrasing (e.g., “you are substantially behind on A” versus “you are slightly behind on A”).

3 Relationships between Concepts

Figure 1 shows our preliminary model of how the concepts are related. The rationale for each link is described in more detail below. By definition, Propensity to Motivation influences Momentary Motivation, so this is not discussed further.

3.1 Personality and Propensity for Motivation

The link between personality and propensity for motivation is well documented. Colquitt and Simmering [6] examined the relationship between conscientiousness and motivation to learn, and found that conscientiousness was linked to Self-Efficacy and learner motivation. Further research investigated all of the traits from the five factor

model and Proactivity [16]. It found that Extraversion, Openness to Experience and Conscientiousness and Proactivity are good predictors of motivation to learn.

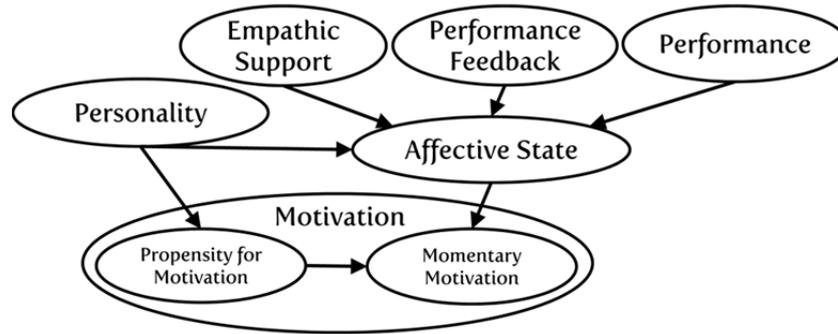


Fig. 1. Relationships between concepts

3.2 Personality and Affective State

Personality traits can be defined as “relatively enduring patterns of thoughts, feelings and behaviours that represent a readiness to respond in particular ways to specific environmental cues”, so emotions constitute part of the traits themselves [11, p1.]. As such, there has been considerable research on the link between personality and emotions, with the link between Extraversion and positive affect, and Neuroticism and negative affect being well established [25]. Conscientiousness is linked to both positive and negative affect: it is related to the positive affect facet attentiveness [31] and the negative affect facet guilt (with conscientious individuals likely to feel guilt when failing to meet their personal aspirations) [11]. Personality can be used as a predictor of affective state, when coupled with performance related to a goal [23, 33].

3.3 Affective State and Momentary Motivation

Although personality provides an indication of how likely somebody is to become motivated, whether they are feeling motivated at any given time (so, momentary motivation) also depends on the individual’s affective state. Earlier research treated affective state as an output after motivation (e.g. [32]), and affective state does not form part of many motivational constructs such as Self-Efficacy [18]. However, more recent research has found that affective state is important as an input to motivation; it contributes to the establishment of goals and self-efficacy [29]. Positive affective states, such as interest, also increase motivation in learners [1, 18] and negative affective states such as anger and anxiety can reduce motivation [2]. An effective motivational strategy needs to consider affect [18].

The relationship between affective state and momentary motivation is complex. In general, positive affective states are seen as conducive to motivation, however certain negative emotions, in particular guilt, can increase motivation [11]. Propensity for motivation however can outweigh this relationship [11].

3.4 Empathic Support and Affective State

Studies have shown that empathic support can influence affective state [e.g., 15, 19, 21]. So, empathic support can be designed to mitigate certain negative affective states.

3.5 Performance, Performance Feedback and Affective State

Learners will feel better when performing well and meeting their own and externally imposed goals. It has been shown that subtle variations in language used in feedback can result in differences in self-reported affective state [30]. As discussed above, performance feedback can be slanted. Using an indirect study, our own preliminary research has shown that slanting influences negative affect for poor performance.

4 Conclusions and Future Work

We have presented a preliminary model of the relationships between concepts such as personality, affect and motivation. We aim to extend this to a Bayesian model, which predicts learner motivation from its contributing factors. To obtain a Bayesian model, Personality needs to be split into personality traits (as personality is not a one dimensional concept). Similarly, Affective State needs to be split into individual emotions. Possible values need to be determined for each node (e.g., “poor” and “good” for performance). The probability needs to be determined for every possible value of a node, given every possible combination of values of contributing factors- e.g., the probability of a learner feeling guilty needs to be determined when performance is poor, the learner conscientious, no emotional support provided, and feedback positively slanted. So, we will also have to study interaction effects between factors.

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