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EMOTIONS ACROSS THE ESSAY: WHAT SECOND-LANGUAGE WRITERS FEEL ACROSS FOUR WEEKS' WRITING A RESEARCH ESSAY

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Abstract

Pekrun's (2000, 2006) questionnaire-based model of academic emotions is widely used. However, Appraisal analysis of qualitative data offers richer detail. This study used Appraisal analysis to assess the subjective attitudes realised by students across four weeks during which they wrote an essay. Results indicate that judgments and appreciations were nearly as frequently-realised as emotions, and the distribution and attitudinal profile differed in all 4 weeks of the task. Positive and negative realisations of capacity, quality, impact and complexity resembled a typical U-shaped learning curve. Polarity suggested that week 3 was the most difficult for participants, and negative emotional dispositions increased across the task where negative surges peaked in weeks 2 and 3. This study highlights the value of Appraisal analysis in detailing the subjective attitudes evoked by academic emotions. It suggests that emotion-focused questionnaires exclude relevant content, concluding for a small set of emotions before sufficient study has been undertaken.

Keywords: academic achievement, academic emotions, second-language writing, essay-writing, Appraisal analysis, subjective attitudes

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Worldwide, university students write essays. Reflecting on this task, they rarely stop to sift and separate their thoughts and feelings. They respond subjectively, and with many diverse attitudes. Consider these comments, taken from reflections written by undergraduates during 4 weeks of producing a research-based essay:

Table 1
Examples of Student Attitudes Realised During Writing a University Essay

	EXAMPLE SUBJECTIVE ATTITUDES FROM STUDENT REFLECTIONS
1	I feel that this course offers a chance for me to grow
2	I feel like I could elevate my language skills
3	I feel a bit worried as I do not know what standard of writing my paper is at
4	I feel like my writing skills are starting to get worse, so its making me feel like this class is starting to get a lot harder
5	I feel like there is a huge weight on my shoulders
6	I feel empty inside haha
7	I feel better and from now on I will not feel stressed again
8	I feel more stressed than the last feelings reflection
9	I feel relieved, tired, and slightly burnt out. If I could, I'd probably go home and take a nice, long nap, stuff my face with snacks, and watch the Fresh Prince of Bel Air.

Some of these statements contain lexis representing emotions with a biophysical substrate ("worried"), some do not ("this course offers"), and some could be considered self-deceptive ("from now on"). Some are metaphorical ("weight"), and some complex, such as example 7's assertion of feeling nothing followed by an ironic laugh. All are authentic statements, written by students who were in the process of producing a research essay. This paper explores the question, if scholars want to find out what learners feel when they are learning, what will give them better data – a questionnaire listing a short set of emotions, or student reflections?

Literature Review

Tertiary writing tasks are complex, involving multiple components and eliciting a variety of emotions. The subjective attitudes realised in the above examples are not biophysically-based emotions, but it would be difficult to say they are not relevant to understanding the experiences that accompany academic work. Subjective states have been increasingly noticed as significant to learning. "The inextricable link between affect and cognition is a fundamental assumption adopted by the major theories of emotion" (Graesser & D'Mello, 2012, 145). Pekrun's (2010) model of academic emotions has been applied by many scholars (Linnenbrink-Garcia & Pekrun, 2011). That model

attaches emotions to four aspects academic learning, framed as achievement, epistemic, social and topic emotions. Achievement emotions such as anxiety/comfort, enjoyment/boredom, or frustration/fulfilment are elicited by learning activities and outcomes, of which some prospectively frame the future such as hope/despair, and some retrospectively characterise the past, such as pride/shame for previous successes of failures (Zeidner, 2007). Epistemic emotions are elicited during complex input when learners are processing information, such as surprise and enjoyment, or anxiety and confusion (Craig, D'Mello, Witherspoon & Graessner, 2008). Social emotions are elicited in the interaction with other learners, such as admiration/contempt, or liking/antipathy (Weiner, 2007). Topic emotions are elicited by learning specific class content. These include a variety of emotions triggered by personal learner responses. While they do not reflect the learning process per se, they can impact it positively or negatively (Ainley, 2007).

Pekrun's model, based mainly on previous work done within states-and-traits psychology, uses the Achievement Goals Questionnaire (Pekrun, Elliot & Maier, 2006) and the Achievement Emotions Questionnaire (Pekrun, Goetz, Titz & Perry, 2002). The latter assesses eight positive and negative emotions (hope, enjoyment, pride, boredom, anger, anxiety, hopelessness, shame), but pre-form emotion within the prompt, for example: "I feel confident while studying", "I feel angry while studying"). Using a questionnaire means that participants do not generate or define the feelings recorded. Thus, our model of academic emotions is to an unknown degree constituted by and reflective of the emotions included in the questionnaire. Further, the questionnaires were administered after the semester's end, and the timing of administration may impact the emotions students report. Then too, data gathered from questionnaires may suffer from the kinds of skews which impact self-reporting (Paulhaus & Vazire, 2007). By comparison, qualitative methods such as free writing are more likely to reveal the full range of emotions involved. Finally, while academic work elicits various emotions, it also elicits a broad range of subjective responses which repackage emotion as judgements and appreciations. It is useful to analyse these, also, in trying to understand the interior states elicited by academic work.

Emotion is a construct. It sits within the broader area of subjective attitude. Contemporary neuroscientific models identify emotions with a biophysical substrate,

but also reveal that we are constantly engaged in appraisals, or multifaceted constellations of responses to external stimuli, which have cognitive, somatic, motivational, situation-specific and communicative dimensions (Scherer, 2000; Moors, Ellsworth & Scherer: 2013). Appraisal models are more complex, allowing that "a person can have a multitude of emotional experiences that do not correspond to the categories proposed by any basic emotions theorist" (Ellsworth, 2013: 126). Systematic organisations of subjective and emotional lexis have also emerged within psycholinguistics, which resemble classifications within psychology and thus are "not arbitrarily posited" (Bednarek, 2009, p 150). Though morphosyntax varies, lexicogrammar realising subjective evaluations is found in all languages and may be taxonomised within semantic classes (Fontaine, Scherer & Soriano, 2013). Sentiment analysis is the collection of techniques used to assess subjective evaluations, including but not limited to emotion, within extensive textual, or corpus data (Argamon, Bloom, Esuil & Sebastiani, 2007). Among these techniques, Appraisal analysis, based in systemic functional linguistics, offers the most semantically delicate result. Appraisal analysis focuses on three systems within language – (a) attitude, comprising the words and phrases through which we evaluate ourselves, others, objects and events, (b) engagement, through which we either take our ideas as clear and correct, or take a stance with reference to a broader discussion, and (c) graduation, through which we emphasise selected ideas (Halliday & Matthiessen, 2004). This study used Appraisal analysis to discover the full range of subjective attitudes realised in student writing, across four weeks during which they produced an essay.

There are four main differences between Appraisal analysis, and Pekrun's model of academic emotions. First is the object of study. Emotion has a complex history of labels and debates (Scherer, 2000; Pekrun, 2016). What Pekrun terms "academic emotion" arose from multiple earlier paradigms from self-regulation to cognition, with "largely unresolved…conceptual boundaries" (Pekrun, 2016, p 121). He therefore subsumes emotion and mood within "affect", bundled together with a set of "omnibus variables" (2012, p. 261) including self-concept, self-beliefs and motivations. Appraisal analysis need not define these constructs, as it assumes that specific areas of lexicogrammar evolved to enable people to realise meanings they wanted to convey. Appraisal denominates the entire field "attitude" (Martin & White, 2005). The Attitude system may be seen in Figure 1.

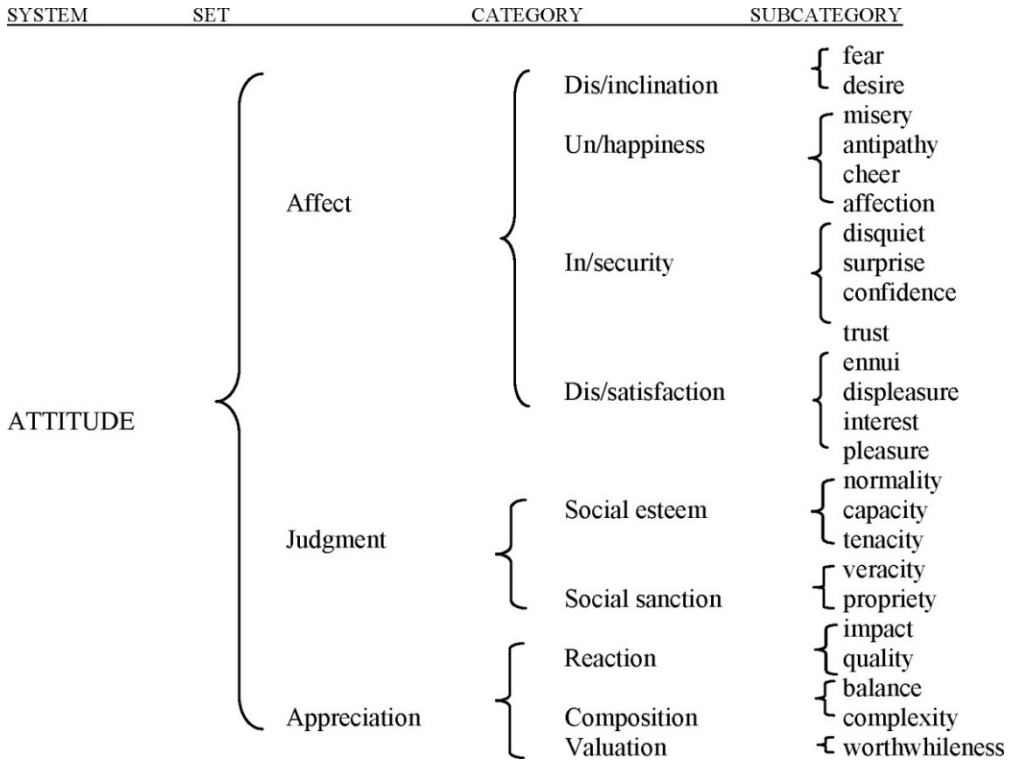

Figure 1. The attitude system

This model acknowledges the physiological substrate of emotion within the fundamental "affect" set, which taxonomises words and phrases realising emotions. Two further sets rework emotion as statements of: (a) judgment, evaluating other people and their actions, and (b) appreciation, evaluating objects and events. Attitudes may be realised directly, by overtly inscribing the attitude ("today's class was very enjoyable"), or indirectly by evoking it ("I had so much fun…I laughed so much"). Direct realisations allow the author to "own" or proclaim an attitude through congruent grammatical structures, which "bear a natural relation to the meanings they have evolved to express" (Halliday, 1985, p. xviii), as in "I love writing". Languages also offer extensive resources for lexicalising emotion, setting it at a distance from the self in various ways. Grammatical metaphor is among these, where an emotional experience has become a noun or a thing (Halliday & Matthiessen, 2006). For example, "Idleness is not in our favor, since there is still a lot to be discovered and developed" performs the author's contextual literacy through sophisticated registerial choices, (ii) deflects criticism by placing the author within a larger similar group, and (iii) projects an improved future state. This statement really is not equivalent to "We're lazy, we know we have to read and write more". This is an example of what may be gained, by attending to nuances rather than fundamentals.

Second, Pekrun's valence comprises two states, positive and negative. This has the merit of making emotional valence clear, but masks authentic nuance. In Appraisal analysis, polarity is represented along a cline. The term "graduation" comprises linguistic resources through which people locate their view finely along a spectrum of opinion (Martin & White, 2005). For example, "it's okay" is only somewhat positive, where "quite good" is moderately positive, and "that is freaking fabulous!" is strongly positive. Negative attitudes may be similarly graduated, and also various neutral ("so-so", "meh"), mixed ("yes and no", "comme ci, comme ça") and self-recusing attitudes ("no comment", "no idea"). Languages offer rich resources for modulating the strength of an utterance, including word choice ("I had gotten a bad grade"), quantifiers ("the sources should contain some specific points that are in the thesis statement"), intensifiers ("I always have so many ideas"), repetition ("As I do more and more research I come in hand with new findings"), modal adjuncts ("If I hadn't understood different sources I would probably be giving the reader a false understanding"), hedges ("Rhet class started to be kind of complicated"), boosters ("I really hope that in the next essay I work at a faster pace") and downtoners ("I need to study like hell") (Thompson & Muntigl, 2008).

Third, what Pekrun calls activation, referring to physiologically stimulating or relaxing emotions, is absent from Appraisal. While acknowledging that the degree of activation is significant to student learning, Pekrun defines no scale – the difficulties of doing so are significant. Appraisal analysis need not define degrees of stimulation, or measure their impact in academic contexts, as it takes language as a proxy for the experiential scales and degrees experienced by people. However, graduation resources are applicable to any attitude realised. Where Pekrun offers "sad" and "exhausted" as low-activation negative emotions, Appraisal graduates authentic and semantically sensible comments like many found in our corpus. For example, the realisations "[t]his week's feeling is being totally exhausted" and "I am really sad that they were the last" would be classified as low-activation by Pekrun, but as strongly intensified negative affect in Appraisal. Both "sad" and "exhausted" are classed as affect by Pekrun, where "sad" would be considered affect (Un/happiness-misery) but "exhausted" a judgment of capacity, within Appraisal. This is not to devalue Pekrun's model - understanding these

as negative and deactivating constructs a useful image of academic emotions. But insight may also be gained from exploring authentic attitudinal nuances using Appraisal.

Fourth is engagement. In both theories, engagement mediates the individual's interiority in relation to context. In Pekrun's model, engagement connects emotion with academic achievement (Pekrun, Elliot & Maier, 2009). Emotions positively or negatively shape cognitive resources and processes, focus attention, enable working memory, assist flow and motivation, facilitating effort and persistence (Pekrun & Linnenbrink-Garcia, 2011). Yet the studies that ground this part of the model are not integrated within a particular research school or theoretical paradigm, reducing their interpretive value and validity. In Appraisal analysis, engagement comprises resources for realising intersubjective alignment (Martin & Rose, 2008). Authors may take a stance dialogically, positioning themselves with respect to a wider community of discourse (Biber, 2006). Numerous clause types allow this alignment, for example shared pronouns, "we" for "I" with author borrowing support for their ideas ("Idleness is not in our favour") (Graff & Birkenstein, 2010). Causes may realise endorsement ("I think that through conferences this issue is resolved"). Typification subsumes the subject within a class of like subjects ("I realized im not a straight to the point kind of writer") (Brinton, 2008).

Pekrun's model of academic emotions reveals major features of the emotions associated with academic work. However, it is not based on any systematic and comprehensive effort to inventory students' emotions, and disregards many other subjective evaluations that academic work elicits. This study used Appraisal analysis to assess personal reflections written over four weeks by students in a freshman composition course, in order to construct an accurate and particularised image of the subjective attitudes elicited by a common academic task. A comprehensive comparison of the two models was not possible in a single paper. This study explores the first and major difference between the two models, emotion vs. attitude. Research questions explored were: how does Appraisal's expanded array of subjective attitudes compare with the eight contained in Pekrun's model, when applied to the data elicited in the personal reflections of students writing an essay? What distribution of positive and negative emotions, judgments and appreciations, were elicited by this academic task? How did attitudes change across the time period during which students were doing the

academic task? What do we gain from using Appraisal's greater detail and nuance, when interpreting the subjective states that academic work evokes?

Method

Participants were 85 undergraduates registered in a freshman composition course. All were Arabic speakers with English skills at the TOEFL iBT83 or IELTS 6.5 level required for studying in an English medium-of-instruction institution. Data was collected in five sections of the course. Participants wrote weekly reflections of about 100 words over four weeks during which they produced an essay. Section teachers followed a teaching protocol, and used the same prompt: "What was this class like for you this week, and why?" Reflections elicit more subjective language than do other academic genres such as essays (Ramanathan & Kaplan, 2000).

Data collection procedures were regulated through a teaching protocol and meetings. During data collection in the classroom, teacher talk was limited to a brief introduction stating that they wanted to find out how students were doing, and respond to any issues arising. The teaching protocol instructed teachers to (1) request that students not comment on the instructor, and (2) remind students to give their personal views ("just tell me about the class and what it's like for you personally. That means what it's like for you when you're in the class and when you're doing stuff out of class"). Teachers were also instructed to (a) tell their classes that different students would have different views and this was entirely acceptable, (b) respond mildly positively to every comment students made about the reflections, (c) validate every view expressed equally with all other views, and (d) encourage students to discuss their ideas with other students if they so desired, but not to engage in such discussions themselves due to the authoritative influence of their role, and to prevent students repeating teacher ideas in an effort to gain favour or grades. Finally, teachers were instructed not to (a) give their own opinion or ideas, (b) agree with one student more than another, (c) write any words on the whiteboard during the reflection task, and (d) discuss the prompt with one student more than another. Students emailed reflections to teachers, who anonymised data and sent it on to a team member functioning as data compiler, who checked it and sent it to a team member functioning as data analyser. A 10-week pilot phase routinised the reflection task for students, ensuring that attitudes realised did not

unduly reflect new experiences in their first semester in university, and accustomed teachers to data collection procedures. Participants wrote two essays during the pilot phase, ensuring attitudes realised reflected an academic task they were somewhat habituated to, rather than an exceptional challenge.

Data was analysed using the software CorpusTool, which offers semi-automatic tagging for the semantic word-classes of the Appraisal system architecture (O'Donnell, 2008). When people express a personal point of view, they choose words from the range of those they are familiar with. These realisations may be aggregated into corpora, in order to seek attitudinal patterns (Pang, Lee & Vaithyanathan, 2002). Automatised text-tagging is long-established in computational linguistics, with softwares applying taxonomically organised concordances built from machine-learning classification tasks, adjusted by human oversight. These softwares efficiently sort text into hierarchicalised word-classes (Polanyi & Zaenen, 2006). That is, they do so more quickly and reliably than human taggers (Subassic & Huettner, 2001). Sentiment analysis softwares apply these tagging techniques to quantify affect, opinion and stance markers (Yang, Lin & Chen, 2007). Emotional lexis is the easiest for softwares to tag (Elfenbein & Ambady, 2002). While machine-tagging is imperfect, software can disambiguate most cases of unclear language, for example homonyms for synonyms, and mis-spellings. While error rates are low, machine tagging has difficulty with squeeze-text, sarcasm and irony (Argamon, Bloom, Esuil & Sebastiani, 2007). For this study, machine attributions were checked by the lead researcher, who has hundreds of hours of experience with Appraisal analysis and software tagging. This combination is viewed as most reliable (Wiebe, Wilson & Cardie, 2005).

Data

Data from the five sections was aggregated into a corpus of 43 075 words, and separated into 4 weekly subcorpora. The number of participants varied across the four weeks from 85 in the first to 60 in the final week. Subcorpus size ranged from 12,496 words in week 1 to 6,378 words in week 4. Average reflection length varied from 157.06 words in week 2 to 112.3 in week 4. The number of attitudes realised ranged from 2092 in week 1 to 1163 in week 4. Attitudinal density ranged from 167.41 words/1000 in week 1 to 172.60 in week 4, as in Table 2.

Table 2
Corpus and Weekly Subcorpora Data

W	NP	NC	AVL	N AT	-VE	%	+VE	%	AT DEN
1	85	12 496	148.76	2 092	786	37.57	1 306	62.43	167.41
2	78	12 251	157.06	1 887	695	36.83	1 192	63.17	154.03
3	82	11 590	141.30	1 983	1 019	51.39	964	48.61	171.10
4	60	6 738	112.30	1 163	564	48.50	599	51.50	172.60
	mNP=76	T=43 075	a=139.86	T=7 125	T=3 064	a=43.57	T=4 061	a=56.43	a=166.29

Realisations of attitude were unevenly distributed among the Affect, Judgment and Appreciation sets. Affect comprises lexicogrammar realising emotions with a biophysical substrate ("Im SO SO scared about this essay"). Judgments rework emotion as assessments of people and behaviours. Judgments of social esteem assess social roles, norms and expectations. For example, "Doctor is very understanding when we ask for extra time" reworks a positive feeling of pleasure as an attribute of another person. Judgments of social sanction assess matters of law, rules, duties, religion, right and wrong ("thanks for the style sheet guide which gives instructions on how should it be") (Hunston & Thompson, 2000). The Appreciation set comprises lexicogrammar reworking emotion as evaluations of objects and events outside ourselves. For example, "I still need to practice more on reading complex material" reworks a negative feeling of displeasure as an attribute of academic work.

In total, there were almost equal realisations of Affect and Appreciation, with less Judgment. However, distribution varied across the weeks, as in Figure 2.

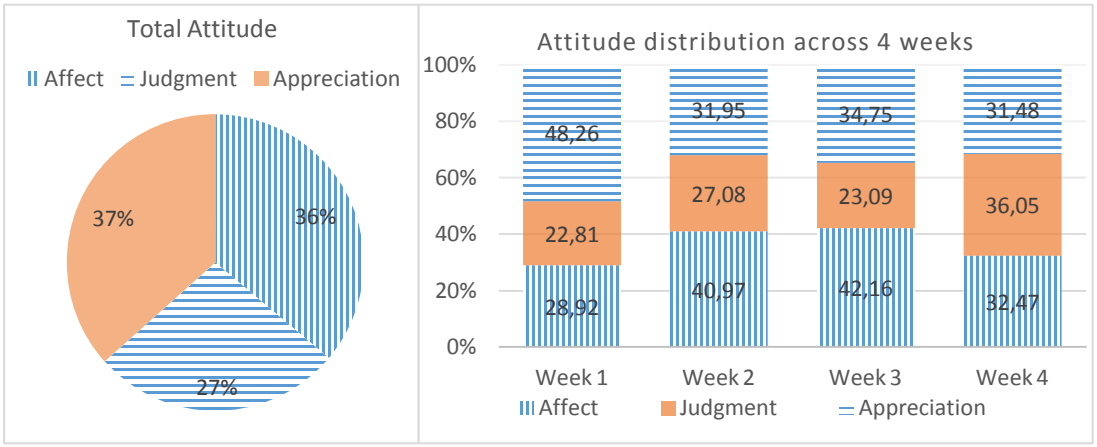

Figure 2. Distribution of affect, judgment and appreciation in total, and over 4 weeks, using Appraisal analysis

By comparison, using Pekrun's 8 emotions to represent student emotions realised through elicited qualitative data constructs a very different image, as in Figure 3.

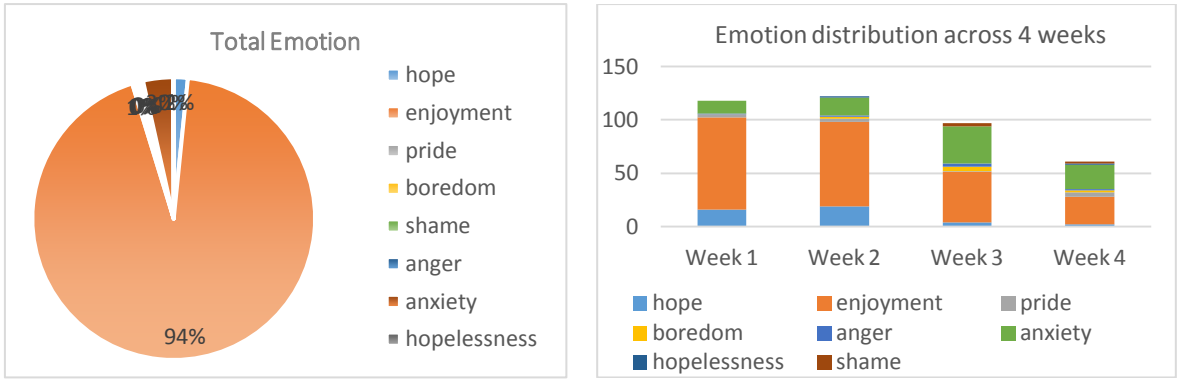

Figure 3. Distribution of emotion in total, and over 4 weeks, using Pekrun's model

Using Pekrun's model, the presence of some specific emotions is exaggerated. Thus, using Pekrun's model, we would conclude that enjoyment was the overwhelmingly most frequent emotion experienced during writing the essay, and anxiety the most common negative emotion. Yet this was not a frequent experience, occasionally students felt hope, and other emotions were not frequently experienced.

Appraisal analysis revealed different profiles for each week as in Figure 4. More judgment and appreciation than affect were realised in week 1. Affect increased in weeks 2 and 3, where Appreciation decreased. In week 4, the number of subjective attitudes decreased in all three sets, though judgment increased proportionately to the other two, and the amount of realisation in all three areas was fairly equal, as in Figure 3. By comparison, Pekrun's questionnaire data was collected after all academic tasks had been completed (Pekrun, Goetz, Titz & Perry, 2005; Pekrun, Elliot & Maier, 2006).

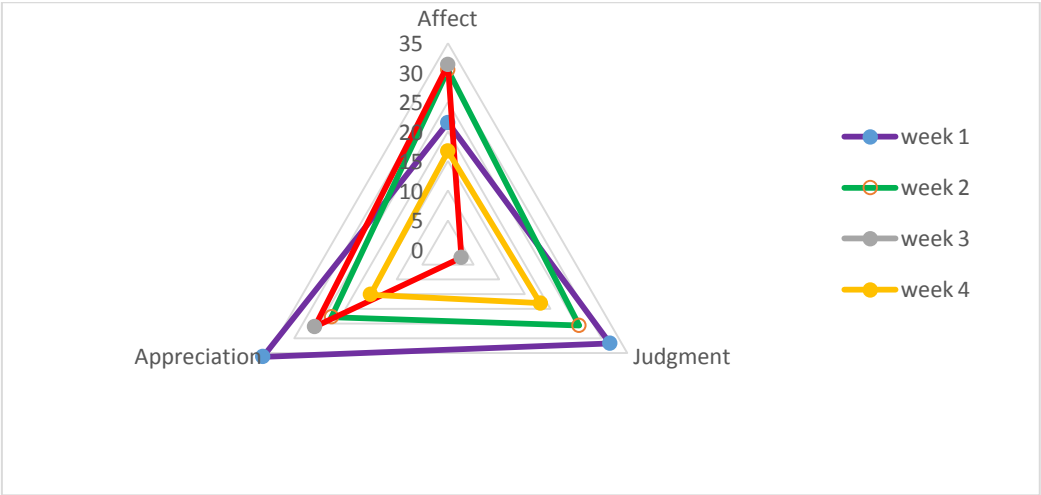

Figure 4. Comparison of weeks for distribution of affect, judgment and appreciation

They capture emotion at one moment only, and that moment is not actually part of the learning period. Pekrun's model could accommodate a time series through periodic use

of the questionnaires. But this leaves the question of what measures to use to represent emotional variation across the learning task.

Realisations in the ten most frequently-realised subcategories comprised 50-85% of all positive and all negative attitudes, in all weeks (see Appendix 1). Of these, Judgments of capacity, and Appreciations of impact were the most common, followed by Appreciations of complexity and quality, as in Figure 5.

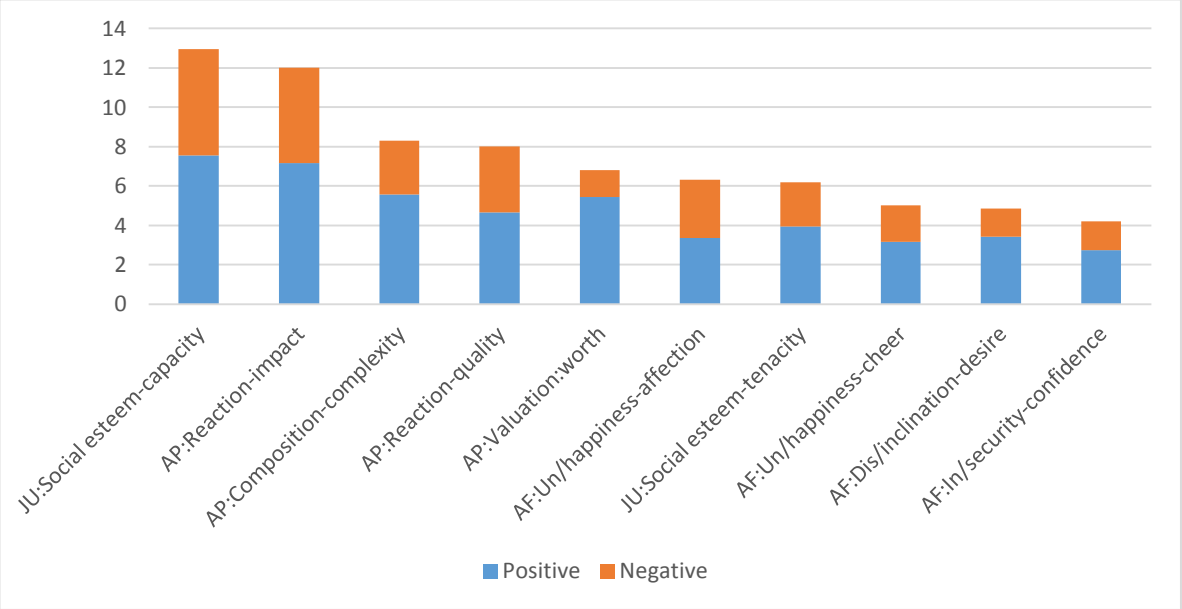

Figure 5. Ten most frequently-realised attitudes, ranked (positive-negative percent)

Feelings of affection and judgments of tenacity and worth were realised about half as frequently as capacity and impact. Feelings of cheer, desire and confidence were realised about one-third as frequently as capacity and impact. The 24 semantic subcategories included in the Attitude system reflect the available lexicogrammar – words and phrases that have developed to allow people to say things they want to say. While many subcategories are not strongly realised in response to a given experience, Appraisal makes proportions and comparisons possible and visible. Pekrun's model includes only a small part of this potential.

Attitudes were more positive than negative in all but week 3, as in Figure 6. Negative attitudes ranged from 36.83% in week 2 to 51.39% in week 3 (see Table 1). Positive attitudes ranged from 48.61% in week 3 to 63.17% in week 2. Compared to Pekrun's model, Appraisal analysis distinguishes kinds of affirmation and negation, placing attitudes on a cline, and identifying prior versus contextual meanings (Wilson,

Wiebe, & Hoffman, 2009). While a full analysis of polarity in the reflections corpus cannot be done in this paper, analysis of dispositions and surges, and of specific positive and negative attitudes, suggest the value of treating polarity as complex.

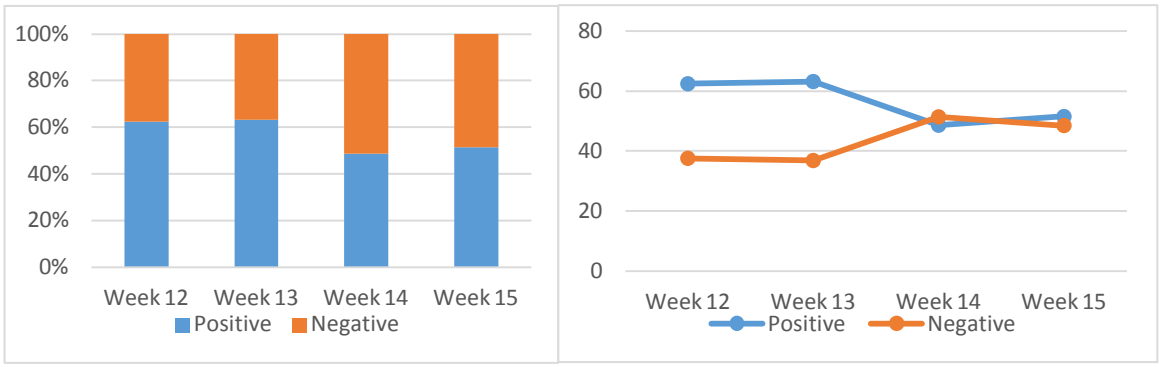

Figure 6. Positive and negative attitudes across 4 weeks

Appraisal analysis distinguishes between emotions realised as an ongoing dispositions ("I like to write, I do it in my free time", "The assignment that we are currently working on is worrying me"), and those realised as surges ("I felt really disappointed after my bad performance in the last exam", "I was too excited about starting the primary research"). In this corpus, there were more negative surges than dispositions. Negative dispositions increased slightly over the four weeks, where negative surges rose in weeks 2 and 3, and fell in week 4. There were more positive dispositions than surges. Dispositions varied slightly across the 4 weeks, where dispositions rose slightly in week 2, and then fell, as in Figure 7.

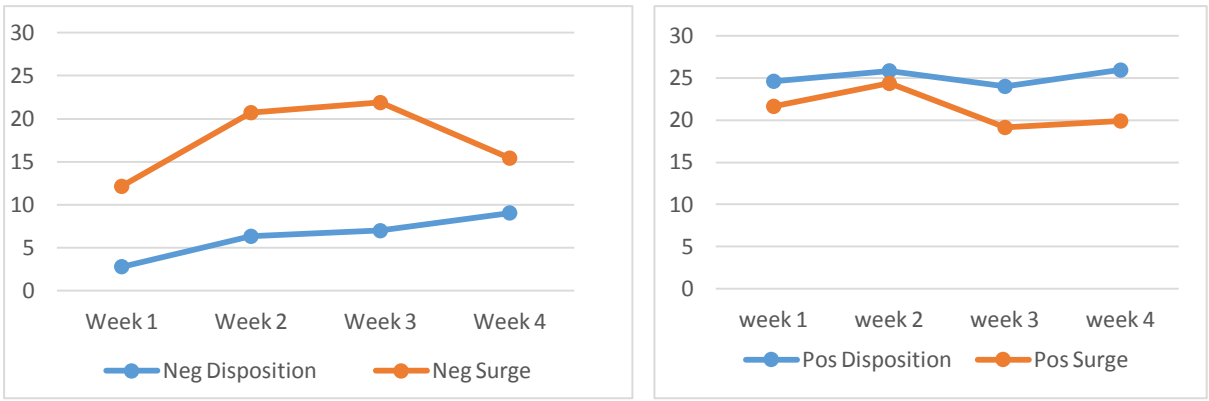

Figure 7. Negative and positive affect as dispositions and surges, across 4 weeks

Changes in specific positive and negative attitudes across the 4 weeks reveal the complexity of the subjective experience of academic work. Positive Judgments of capacity increased in week 2, decreased in week 3, and remained unchanged in week 4. Judgments of capacity ("can," "know how to", "able to", "have the ability", "have the knack", "am X enough to", and so on) realise skills the writer has attained and routinely

puts into action (Panther & Thornburg 1999). This suggests students felt they were able to do the task during the initial half of the period, then felt less able, with these feelings remaining stable in the final week, at a slightly lower level than they had begun with. A similar pattern was found for Appreciations of quality, which rework emotion as attributed characteristics of an event or object outside the self ("this wonderful material that has been illustrated through classes") (Scherer, Schoor, Johnstone, 2001). The qualities of the task were experienced as increasingly positive during the first two weeks of work, after which this decreased below the initial level, where it remained at the end of week 4, as in Figure 8.

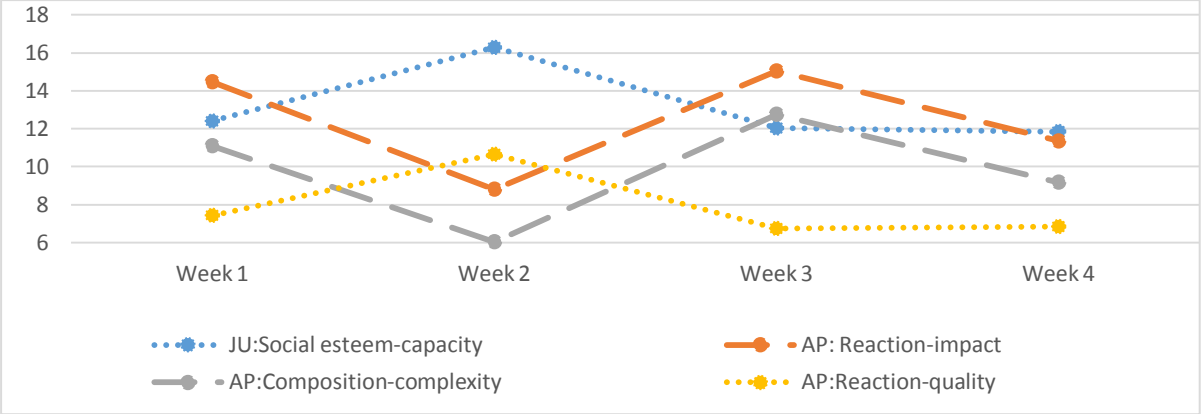

Figure 8. Positive capacity, quality, impact and complexity across 4 weeks

An opposite pattern was found for reactions of impact and appreciations of complexity. Reactions of impact rework emotions as attributes of objects and events outside the self. For example, in "this last week was the most exciting one in the whole course", the attitude clearly realises the writer's feeling, even though grammatically it modifies "week". These are the closest attitudes to emotion, outside the affect system (Martin and White, 2005, 25). Appreciations of complexity rework emotion in terms of composition and order ("avoidance of hasty generalizations is key in order [to] argue one's point logically and in a formal manner"). The increase in realisations of capacity coinciding with a decrease in complexity at the end of week 1, followed by a reversal between weeks 2 and 3, resemble the typical U-shaped learning curve. This is when an initial period of confidence is followed by a period of more realistic understanding of the task demands, which elicits student effort and thus learning (Case & Moelius, 2007).

This interpretation is supported by frequently-realised negative emotions. Realisations of negative capacity ("i am unable to pull it through and get it together") decreased over 3 weeks, and then levelled off. Negative impacts decreased, but increased again as the deadline loomed ("all the deadlines is stressing me out"). Negative complexity and quality followed the same pattern as positive complexity and quality: decreasing at first, then increasing, probably reflecting a more realistic assessment of the challenges of the academic task, as in Figure 9.

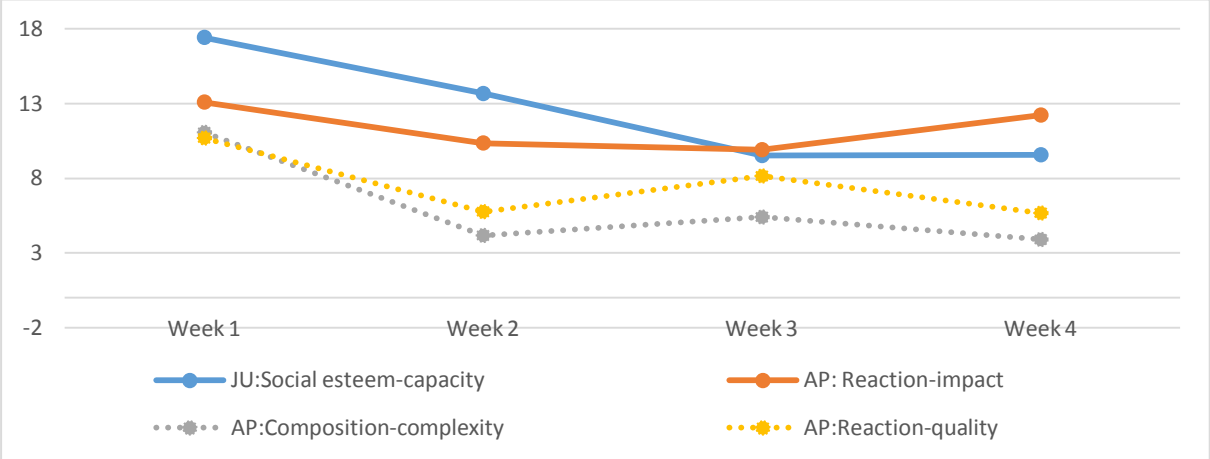

Figure 9. Negative capacity, quality, impact and complexity across 4 weeks

Discussion

This study has generated five main results. First, the relatively equal distribution of affect, judgment and appreciation indicates that emotion is not the only area significant to understanding students' subjective experiences in doing academic work. This is not surprising: all languages include resources for people to realise subjective attitude indirectly, as this is a cornerstone of polite pragmatics in most cultures (Leech, 2014). This result highlights the potential for altering and developing our theoretical understanding of the subjective states associated with and elicited by academic achievement, by including the full area of subjective evaluation.

Second, the potential for Appraisal methods to contribute to developing Pekrun's model has been made visible in this paper. These differences have the capacity to develop both the theory of academic attitudes, and to contribute to developing methodological approaches to this issue. For example, they include (a) the impact on our understanding of academic attitudes, depending on whether we choose to notice the

entire attitudinal range or only some emotions, (b) the impact of method on results, particularly the question of pre-determining a specific list of relevant emotions and Appraisals as compared with allowing them to emerge from participant realisations, (c) the potential for studies of appraisals collected as a timeseries across the period of the academic work, to re-envision current models of academic attitudes as a dynamic and staged process, as compared to focusing on emotions recollected after the work has been completed, (d) the suggestion of model development inherent in this study's discovery of frequently-realised emotions which were not noticed in Pekrun's model, especially capacity, impact, quality and complexity, (e) the utility of measures such as polarity, dispositions and surges to detail our model of academic attitudes, and (f) the suggestion that specific emotions and evaluations covary across the timeframe of academic work. The results of this study do not warrant any rejection of the current model. But they do suggest the interpretive possibilities that could accompany widening the area of response through Appraisal analysis.

Third, the ten most frequently realised attitudes demonstrate that Appraisal analysis may nuance the current model. This has utility, in broadening the applicability of the model to the study of diverse populations. As more of the world's population gains desired access to higher education, and as higher education becomes globalised, more studies will be needed of academic attitudes, noticing variables such as culture, gender and individual differences.

Fourth, the difference of the final week in polarity, the specific positive and negative emotions realised, and the amount of attitude realised, may reflect the smaller subcorpus size, but also may reflect genuine differences in academic attitudes at a late stage in the learning process. These results imply significant differences across the timeframe of academic work, and suggest that stages might be articulated. Fifth, encoding dispositions as compared to surges suggests the value of considering both states and traits in a comparative framework, as impacting the subjective experience of academic work. Appraisal analysis may be amenable to use in defining individual differences, and then modelling these across the timeframe of a piece of work.

Conclusion

This study has raised some questions about how to develop the current model. Among these, the following seem significant: how should we determine which attitudes to include in a model of academic achievement-related evaluations? Those which are numerically most frequently realised? Those realised at a specific stage of the work undertaken, or those which define a particular stage? What measures should we use to indicate (a) the initial emotional state, (b) the polarity and semantic change across the learning period, (c) an end state, and (d) frame individual and cultural differences? Finally, how do we balance clarity against authenticity and richness of data. In an era of increasingly extensive data mining, there are many practical options for using large datasets to model complexity. The value of Pekrun's model is that it offers clarity in defining central issues. This study's limitations include a small and second-language participant group, one academic task type, an inability to access attitudes after the duedate, and possible cultural impacts. Still, it suggests that we cannot determine these elements until we have assessed the detail.

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Appendix 1

A. *Positive realisations in the ten most frequently-realised attitudes*

RANK	ATTITUDE	WEEK 1		WEEK 2		WEEK 3		WEEK 4	
		N	%+VE	N	%+VE	N	%+VE	N	%+VE
1	JU: Social esteem-capacity	162	12.40	194	16.28	116	12.03	71	11.85
2	AP: Reaction-impact	189	14.47	105	8.81	145	15.04	68	11.35
3	AP: Composition-complexity	145	11.10	72	6.04	123	12.76	55	9.18
4	AP: Reaction-quality	97	7.43	127	10.65	65	6.74	41	6.84
5	AP: Valuation-worth	124	9.49	113	9.48	66	6.85	82	13.69
6	AF: Un/happiness-affection	43	3.29	82	6.88	58	6.02	26	4.34
7	JU: Social esteem-tenacity	78	5.97	62	5.20	76	7.88	63	10.52
8	AF: Un/happiness-cheer	68	5.21	87	7.30	34	3.53	32	5.34
9	AF: Dis/inclination-desire	73	5.59	85	7.13	61	6.33	23	3.84
10	AF: In/security-confidence	49	3.75	75	6.29	35	3.63	34	5.68
		1028		1002		779		495	
		78.71% +Att		84.06% +Att		80.81% +Att		82.64% +Att	

B. *Negative realisations in the ten most frequently-realised attitudes*

RANK	ATTITUDE	WEEK 1		WEEK 2		WEEK 3		WEEK 4	
		N	%-VE	N	%-VE	N	%-VE	N	%-VE
1	JU: Social esteem-capacity	137	17.43	95	13.67	97	9.52	54	9.57
2	AP: Reaction-impact	103	13.10	72	10.36	101	9.91	69	12.23
3	AP: Composition-complexity	87	11.07	29	4.17	55	5.40	22	3.90
4	AP: Reaction-quality	84	10.69	40	5.76	83	8.15	32	5.67
5	AP: Valuation-worth	32	4.07	8	1.15	24	2.36	23	4.08
6	AF: Un/happiness-affection	96	12.21	62	8.92	40	3.93	31	5.50
7	JU: Social esteem-tenacity	59	7.51	36	5.18	39	3.83	25	4.43
8	AF: Un/happiness-cheer	3	0.38	54	7.77	39	3.83	35	6.21
9	AF: Dis/inclination-desire	2	0.25	13	1.87	30	2.94	10	10.11
10	AF: In/security-confidence	12	1.53	19	2.73	34	3.34	29	5.14
		615		428		542		330	
		78.24% -Att		61.58% -Att		53.19% -Att		58.51% -Att	