Integrating personality, cognition and emotion: Putting the dots together?

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The process of science is sometimes reminiscent of a pointillistic painting. We all work in our individual labs studying how to best color a few dots so they fit together. But when we come together at a scientific conference or in a well edited book, we can, if the organizers or editors did their job, see a beautiful canvas such as Seurat's *Sunday on La Grand Jatte*. The 2nd Warsaw Biennial Symposium on Personality and Social Psychology was just such a conference. Although not all of the papers presented in Warsaw in the fall of 2008 are included in this book, the ones that are give a flavor of the breadth and depth of the conference and make substantive contributions to the integration of the seemingly disparate fields of personality, cognition, and emotion.

In the original call for the conference, the organizers emphasized the need for "a forum for the cross-discipline discussion of the important issues concerning human brain and mind". This was an ambitious call, but met by the papers given at the conference and the chapters in this volume. For indeed the

> conference [did] provide an opportunity to exchange ideas and to work out an integrative and interdisciplinary approach to the considered processes and phenomena within the following study fields: foundations of personality, cognition and emotion; intraindividual dimensions and unconscious processes in cognition and emotion; the role of self in cognition and emotion; individual differences, attentional processes and emotion; individual differences, memory and emo-

tion; individual and social perspectives on emotional disorders, and therapy of emotional disorders.

Some of us who study personality and individual differences tend to focus on the big picture at the cost of blurring over important details in emotion, cognition, and biology. For us, this conference was an opportunity to consider the details and also a chance to consider how they relate to each other in the broad brush picture we call personality. For personality is the study of the coherent patterning over time and space of affect, cognition, and desires as they lead to behavior. That is, personality is the study of patterns over time of how what we do is the consequence of how we feel, what we think, and what we want.

Most psychologists would argue that what they study is at the core of psychology and the understanding they bring to the field is essential. At least for the second point, they are, of course, correct. But those of us who study personality and individual differences tend to be generalists and are faced with the additional challenge of integrating findings from social psychology, cognitive psychology, neuro-psychology, and behavior genetics by using experimental and correlational methodologies combined with recent developments in modeling and psychometrics (Revelle, Wilt, & Condon, 2011). As a result, we face the tradeoff of focusing on the details of each study in each domain at the cost of seeing consistencies across domains, or we can examine the big picture at the cost of throwing away important details. But, as we know from the examples of Chuck Close (Storr, Close, Varnedoe, & Wye, 1998; Pelli, 1999) or Georges Seurat (Herbert, Seurat, & Art Institute of Chicago, 2004), confusing details when examined too closely can produce amazing coherence when viewed at a greater distance.

The ABCDs of Personality

This volume is a discussion of the interrelationships of personality, emotion and cognition. It is useful, then, to consider what we mean by these terms. Unfortunately, these are fuzzy concepts with different meanings to different scholars. The solution my colleagues and I have attempted is to combine Plato's original tripartite organization of the soul into reason, passion and desire (*The Republic*) with a levels of processing model partially derived from computer science (Ortony, Norman, & Revelle, 2005) as well as from cognitive (e.g., Broadbent, 1971) and biological (MacLean & Kral, 1973; MacLean, 1990) perspectives. That is, in more modern terms, we consider how cognition, affect, and desire function at reactive, routine, and reflective levels of processing as they lead to the observable outcome of behavior. We agree with e.g., Hilgard (1980); Matthews, Campbell, et al. (2002); Mayer (2001); Scherer (1995) that Plato's trilogy of the mind still has utility in today's thinking. We represent behavior and the trilogy of the mind in terms of a tetrahedron with the four corners denoting the *aspects* or *elements* of affect, behavior, cognition and desire. This then allows us to categorize research into those four aspects as well as six *edges* (e.g., affect x behavior, affect x cognition, behavior x cognition, etc.), four *facets* (e.g., affect x behavior x cognition, affect x behavior x desire, etc.) and finally, the

complete space defined by the tetrahedron. My colleagues and I have used this taxonomy before (Wilt, Oehlberg, & Revelle, 2011; Wilt & Revelle, 2009) and I use this taxonomy when considering the chapters in this volume.

Although we first introduced the Affect, Behavior, Cognition and Desire (ABCD) analysis in the context of studying emotion (Ortony et al., 2005), we have since generalized the analysis over the temporal dimension to define personality. For personality is to emotion as climate is to weather ("personality is what you expect, emotion is what you get"). That is, personality may be be understood as the *coherence* over time and space of Affect, Behavior, Cognition and Desire. The crucial term here is coherence rather than merely an average. For applying our analogy, although the average temperatures in Warsaw and San Francisco are very similar, the variance and the patterning of the seasons is very different. Personality is thus not just the average ABCD over situations, but rather reflects an individual's unique temporal signature over situations (Fleeson, 2001, 2007; Funder, 2006).

My analysis will be similar to those in which we have considered several dimensions of personality in terms of the relative contributions of the ABCDs. Extraversion may be considered in terms of positive affect, approach behavior, broad versus narrow cognitive processing and desires for leadership and dominance (Wilt & Revelle, 2009). Similarly, anxiety may be considered in terms of negative affect, avoidance behavior, biased cognitive processing, and prevention goals (Wilt, Oehlberg, & Revelle, 2011)

The basic elements

If personality is the coherent patterning over time and space of affect, behavior, cognition, and desire, we need first consider what these four terms represent. Are they in fact separable; do they have any defining characteristics? That is, we need to clarify what we mean by affect, behavior, cognition, and desire. Unfortunately, this is not as easy as one would like, for these also are fuzzy concepts with a great deal of conceptual overlap.

Those who study how affective mechanisms can influence executive control process in intelligence and creativity, e.g., Edward Nęcka (Chuderski & Nęcka, 2010; Nęcka, 2000) tend to agree with Zeelenberg, Nelissen, Breugelmans, & Pieters (2008):

> Affect is a generic term that refers to many experiential concepts including moods, emotions, attitudes, evaluations and preferences. The defining feature is the valence dimension.(...) It refers to the extent that an experience is positive or negative, good or bad, or pleasant or unpleasant. Thus, any experiential concept that is positive or negative can be considered affective (p 19).

Although we agree with Zeelenberg et al. (2008) when they argue that emotion is more than affect, and that affect includes mood states, we disagree that all affect is necessarily valenced. We rather think in terms of core affect as a *feeling state* which typically but not necessarily includes both valence and arousal. This is a different position from those who conceive of core affect as always representing a mixture of affective valence

and arousal (Barrett & Russell, 1998), or those who think solely in terms positive and negative affect (Tellegen, 1985; Tellegen, Watson, & Clark, 1999). We prefer to focus on energetic and tense arousal (which are associated with but do not include valence) (Thayer, 1989, 2000) and how the two covary with but are not synonymous with positive and negative affect. This issue is discussed in more detail in Matthews & Fellner (this volume). Nor do we equate emotion with just affect, for to us a full fledged emotion represents an integration at one time of all of the ABCDs (Ortony et al., 2005). In lay terms, affect is how we feel.

Cognition reflects how we know and make sense of the world; cognitive processes involve perceiving, encoding, storing, and retrieving representations of the world. Cognition reflects one's thoughts, knowledge and beliefs and ways of thinking and problem solving. However, cognitive processes are not always (in fact, are probably rarely) conscious and available to reflection. Most of our perceptual, encoding, storage and representation is done automatically and without access to direct control. None the less, whether with or without awareness, cognition is how we think.

Desires are goals, wants, strivings and are grouped under the rubric of motivations. They may as mundane as hunger for a pizza or as broad as wanting to help mankind avoid existential threats such as global climate change or nuclear war but our desires and goals are organizing principles for our actions and inactions. Desires answer the question of why we choose to do something and not something else.

Finally, behavior is what we do. Behavior may be directly observable (walking, talking, fighting, fleeing), or unobservable (increase in heart rate or blood flow in a specific region of the brain). Knowing or wanting to do something is not enough, it is by what we do that we are judged.

Clearly these four aspects are ideal cases and most of what we do involves thinking, feeling, and wanting. But by examining behavior in terms of these aspects as well as *levels of processing* and *temporal coherence* we find that seeming inconsistencies are resolved (Ortony et al., 2005)

Except for the overemphasis upon Stimulus-Response behaviorism of the early and mid 20th century, the use of affect, cognition and desire as unobservable latent variables characteristic of the organism has had a long and fruitful history. Indeed, a common thread in the thinking of Plato to Thomas Aquinas to Wundt and James has been the distinction between thoughts, feelings and desires. This distinction continues to this day. We do not want to reject the importance of behavior, for that is the ultimate criterion, but we use these organismic variables of thoughts, feelings and desires as explanatory devices for the different behaviors that result from a particular set of situational cues. In traditional terms, we want to examine the O in the S-O-R model (Woodworth & Schlosberg, 1954). In more contemporary terms, we view affect, cognition and desires as latent mediators between environmental inputs and behavioral outputs (MacKinnon, 2008).

What was perhaps missing from the early S-O-R models was the realization that the entire process is a continuous loop, with responses affecting the environment which in turns leads to different stimuli (Wachtel, 1973). Thus the model could be seen as ...

S-O-R-S-O-R-S-O-R-S-O-R ... . It is perhaps arbitrary to focus on the response side when we could potentially focus on the latent mediators. For except for rats running mazes, or for undergraduate students in psychology experiments, choices have consequences and yesterday's behaviors affect today's environment and tomorrow's thoughts and feelings.

The basic elements

Although none of the chapters in this volume can be categorized as pure exemplars of any one aspect, several of them focus more heavily on affect while others more heavily on cognition. The rest tend to be integrative studies of edges (e.g., affect and cognition, affect and desire).

Affect

Matthews & Fellner (this volume) consider the energetic components of affect and question how energetics and Emotional Intelligence affect various performance tasks. Their review of prior work emphasizes the importance of Robert Thayer's distinction between *energetic* and *tense* arousal (Thayer, 1989, 2000) and stresses the importance of the energetic arousal component of affect.

This is important work for it shows that one dimension of momentary affective state, energetic arousal, as assessed by either Thayer's scales or Matthews' Dundee Stress State Questionnaire (Matthews, Campbell, et al., 2002) is only slightly related to affective valence but strongly related to various performance measures. Although some describe affective space in terms of a circumplex with no fundamental axes (Russell, 1980; Russell, Lewicka, & Niit, 1989) or in terms of valence and arousal (Barrett & Russell, 1998), or positive and negative affect (Tellegen, 1985; Tellegen et al., 1999), Thayer's energetic arousal dimension relates more to diurnal variation and performance on cognitive tasks. Tense arousal, on the other hand, reflects environmental threats to the organism. That energetic arousal is not just a mixture of valence and arousal has been clearly shown by Schimmack & Reisenzein (2002) and that the affects of sadness and happiness are not bipolar opposites by Rafaeli & Revelle (2006).

Matthews' three dimensions of affect (Energetic Arousal, Tense Arousal, and Hedonic Tone) are reminiscent of the prior work of Wundt (1904) who discussed dimensions of pleasure-displeasure, excitement-inhibition, and tension-relaxation (see also Reisenzein, 1992; Schimmack & Reisenzein, 2002). Emphasizing these three dimensions of affect and their unique pattern of correlations is important as it pushes beyond a premature consensus of a two dimensional affective structure. By going beyond the simple analysis of the correlational structure of affective terms, and examining the behavioral correlates or the differential responses to stress manipulations, Matthews and his colleagues have provided strong evidence for a three dimensional model. My colleagues and I have reported similar demonstrations of the structure of affect when considering differential patterning of tense arousal and negative affect in response to affect inducing films (Rafaeli & Revelle, 2006).

When the level of analysis changes from between subjects to within subjects, the structure of affect is somewhat more complicated, in that people systematically differ in the correlation between either Energetic Arousal and Tense Arousal or Positive Affect and Negative Affect (Rafaeli, Rogers, & Revelle, 2007; Wilt, Funkhouser, & Revelle, 2011). That is, while the majority of people find EA and TA as independent dimensions, for some they are *synchrononous* and covary positively while for others they are *desynchronous* and covary negatively. It seems as if variations in this correlation reflect how the situation is appraised, whether it is seen as a threat (leading to desynchrony) or a challenge (leading to synchronony) (Wilt, Funkhouser, & Revelle, 2011).

Matthews & Fellner (this volume) consider the relationship of energetic engagement with emotional intelligence. That this relationship is less than many would have expected is consistent with prior findings from Matthews and his colleagues (Matthews, Zeidner, & Roberts, 2002). In the first study reported by Matthews & Fellner (this volume) they find that perhaps the best measure of Emotional Intelligence as an ability, the Mayer-Solovey-Caruso Emotional Intelligence Test (MSCEIT, Mayer, Salovey, & Caruso, 2002; Mayer, Salovey, Caruso, & Sitarenios, 2003) did not support their EI as energization hypothesis. This is not completely surprising, because it is not clear that the MSCEIT is actually a measure of *emotional affect*. If it measures anything, the MSCEIT measures crystalized knowledge about emotion, not fluid emotional experience. For it is conceptually possible to write a computer program that would pass a Turing test if given the MSCEIT (Ortony, Revelle, & Zinbarg, 2007). The three subsequent studies examine EI as a personality trait rather than as an ability (what one normally does versus what one can do). Once again, the relationships with important performance measures are not impressive.

The important conclusion from the Matthews & Fellner (this volume) chapter is that we should pay more attention to task engagement and energetic arousal as indices of attentional resources. State affect does indeed predict state cognition, but mainly through the mechanism of resource availability associated with energetic arousal.

Cognition

As would be expected in a volume emphasizing the integration of personality, affect, and cognition, there were no chapters emphasizing isolated cognitive processes. Some, however, did make cognition their primary focus. Thus, the chapter by Szymon Wichary and his colleagues (Wichary, Domaradzka, & Sędek, this volume) considers the effects of cognitive aging as it moderates reasoning and decision making. When considering such cognitive effects, it is also necessary to examine affect as a source of information both prospectively when choosing behaviors as well as in terms of feedback on performance after executing a behavior. Concepts of executive control as modulated by affect need to be considered (Chuderski & Nęcka, 2010). Executive control modulates goal directed behavior, particularly in the case of choosing between multiple goals and multiple motivations. Attention can be both focused too broadly or too tightly upon stimulus cues (c.f., Easterbrook, 1959) and the broadness of the "attentional spotlight" can be modified by individual differences,

caffeine induced arousal, and task demands (Anderson & Revelle, 1982).

Affect and Cognition

That how we feel influences how we think is a basic assumption of clinical psychology but one that is unfortunately much ignored by cognitive scientists and their theories of rational decision making so popular in economics. Although early demonstrations that emotional states affected learning (Yerkes & Dodson, 1908) and motivational states affected performance (Blodgett, 1929; Tolman & Honzik, 1930) the cognitive revolution that began in the mid 1960's and influences theories to this day has tended to ignore the competence-performance distinction. Theories of the effect of anxiety on performance were developed primarily by personality, clinical and more recently by sports psychologists. Few cognitive psychologists focused on the problem. A major exception to this generalization is the work of Michael Eysenck and his collaborators (M. W. Eysenck, Derakshan, Santos, & Calvo, 2007; M. W. Eysenck, 2000; M. W. Eysenck, Lister, & Weingartner, 1991; M. W. Eysenck & Derakshan, 2011) as well as Gerald Matthews (Matthews, Panganiban, & Hudlicka, 2011) who have consistently argued for an integrative model of affect and cognitive performance. Eysenck's chapter in this volume is a thorough review of his work on the effects of anxiety on cognitive performance.

That high test anxiety is related to poor cognitive performance is well known (Stöber & Pekrun, 2004). However, a recurring problem in the study of the anxiety-performance link is one of causality. That is, do people perform badly because they are anxious, or are they anxious because they perform badly? This can not be addressed by correlational studies, but can be answered by experimentally manipulating anxiety (either increasing it by threats or decreasing it by clinical interventions) and then observing the effect on performance.

But what performance to measure? Eysenck and his colleagues have followed the cognitive tradition of trying to use "process pure" tasks (M. W. Eysenck, this volume). The logic is that the complex tasks associated with anxiety effects are composed of simpler tasks and it should be possible to find the systematic affects of anxiety on one of these purer (or at least simpler) tasks. We had a similar desire when trying to decompose complex tasks into components of working memory and sustained attention (Humphreys & Revelle, 1984) and argued that the working memory component was hindered while the attention component facilitated by arousal. Unfortunately, our experience is that the anxiety effects tend to slip away as one gets purer and purer measures of process. Yes, they are sometimes there, but the effects are subtle and sometimes hard to replicate (Wilt, Oehlberg, & Revelle, 2011). The analogy of aggregating many unreliable items to form reliable item composites (scales) comes to mind. Anxiety might have a small effect upon many pure cognitive measures, but it is only when we aggregate tasks that require multiple cognitive processes that the anxiety effects are robust.

Other examples of the the difficulty of showing anxiety effects upon pure tasks include

the inconsistent effects of anxiety on visual attention in a cueing paradigm (Cooper, Rowe, Penton-Voak, & Ludwig, 2009). Further complicating the anxiety-cognition link is the importance of the interstimulus interval (ISI) (Derakshan & Eysenck, 2009). Anxiety effects that show positive cognitive biases at short ISIs are sometimes negative at slower ISIs (Oehlberg, Revelle, & Mineka, in press).

That anxiety seems more related to deficits in processing efficiency related to the central executive is important (M. W. Eysenck, this volume). But we need to make sure that this is more than diversion of central executive resources from the experimental task due to worry. In an examination of multiple theoretical explanations for the effect of anxiety upon cognitive performance (Leon & Revelle, 1985), we found stronger support for the proposal that anxiety is a distractor (Wine, 1971) that hinders overall availability of cognitive resources than that it is related to a deficit in specific resources associated with memory (M. W. Eysenck, 1979) or cue utilization (Easterbrook, 1959). We also found strategic differences in speed-accuracy tradeoffs as a function of level of state anxiety that made some of the results very hard to interpret.

When examining the effects of anxiety in a task switching paradigm, we should also remember that some of the most robust anxiety-performance findings (e.g., Spence, Farber, & McFann, 1956) disappear when the subject's interpretation of their own performance is considered. That is, when given simple or complex tasks without explicit feedback, anxious participants tend to interpret their performance on difficult or complex tasks as a failure experience and reduce their effort and task engagement. But when explicitly given success feedback, the anxiety by task difficulty interaction effect reverses and the anxious participants do better on harder tasks (Weiner & Schneider, 1971). This result is an example of the importance of considering not just the participants cognitive performance, but their cognitive framing of their performance.

The continuing importance of anxiety studies in personality is seen in the special issue of *Personality and Individual Differences* dedicated to the memory of Błazej Szymura and edited by Corr & Fajkowska (2011). Important articles in that issue include those by M. W. Eysenck & Derakshan (2011) and Matthews et al. (2011).

Going beyond anxiety, Edward Nęcka has examined the affective mechanisms of cognitive control (Chuderski & Nęcka, 2010). To Nęcka, emotion controls cognition and acts as a guiding factor in problem solving and a moderator in memory retrieval. As do many others, his analysis of affect quickly broadens to full fledged emotions which involve cognition, desires, and affects (see also Frijda, this volume). He recognizes the bidirectional effects of emotions on behavior as well as behavior on emotions (one runs when afraid, but can take a brisk walk to elavate affect). What is missing from his analysis is a consideration that current and immediately prior affect seem to change the cognitive resources available. Thus people are more likely to stereotype others when their own cognitive resources are diminished. "Morning people" are more likely to stereotype others in the evening while "evening people" are more likely to stereotype in the morning (Bodenhausen, 1990). Resources can be depleted by social interaction with minorities and although not affecting

the immediate task, hinder subsequent performance (Richeson & Shelton, 2003). Affect can also change to breadth of cue utilization: while positive affect leads to a focusing on the broader aspects of a stimulus ("the forest"), negative affect leads to a focusing on the details ("the trees") (Gasper & Clore, 2002). Indeed, as Dalgleish and his colleagues have shown, resources to recall specific autobiographical memories may be reduced by ego depletion induced by doing a Stroop task (Neshat-Doost, Dalgleish, & Golden, 2008).

It is not just the negative affects that can impair performance. Andrew Cooper has discussed how positive affect can impair performance on tasks that involve careful and deliberative processing of stimuli. It seems as if positive affect may induce a more heuristic problem solving approach and impair set switching

While Eysenck analyzes how affects changes our cognitions, Keith Oatley (this volume) considers how what we think about changes the way we feel. In particular, after reading emotionally laden fiction, people are more able to process their own and others' emotions than after reading non-fiction. To understand the emotions of others is a skill which may be enhanced by training, one form of such training is the reading of fiction. To Oatley (2009), reading fiction is a simulation of the real world and prepares us for interaction in the world just as a flight simulator can prepare a pilot for an emergency landing. That this is not just a stable individual difference (people who like to read fiction are different in many ways from those who read the history of the Punic wars) can be shown by experimentally comparing reading short stories with reading factual accounts matched in content but not emotional tone to the stories. Why should this be? The careful reader of fiction is not just reading about the emotions of others, but is experiencing those emotions themselves. We read and watch books, plays and movies that move us. This provides us with opportunities to simulate the experience of emotion in others and to make us more sensitive to our own and others' emotional states.

Oatley reminds us how important our thoughts are in guiding our interactions. Just as a good narrative can provide training in experiencing emotions, so can one's own narrative allow one to understand and modify his or her emotional reactions. "The stories people fashion to make meaning ouf of their lives serve to situate them within the complex social ecology of modern adulthood" (McAdams, 2008, p 242).

Desire and Behavior

At the same time as Hans Eysenck, Jeffrey Gray, and Jan Strelau and their colleagues (H. J. Eysenck, 1952, 1967; Gray, 1981, 1982, 1991; Strelau, 1987, 1998) were describing two broad dimensions of *affect* and *behavior* that have become associated with positive affect and approach behavior (extraversion) and negative affect and avoidance behavior (neuroticism), others were describing two dimensions of *interpersonal behavior*. How people interact with others was described in terms of a circumplex that could be construed as having dimensions of agency (dominance/ambition) and socialization (communion) (Leary, 1957; Wiggins, 1996). To blend these these two models required the addition of third

dimension (agreeableness to the Eysenck two space, neuroticism to the Leary two space).

Circumplex structures are just two dimensional structures where the items do not show *simple structure* but rather have loadings on both dimensions (Gurtman, 1997, 1994). As already discussed, adjectives describing affect typically have this characteristic (Russell, 1980; Russell et al., 1989) but may be equally well represented in terms of the dimensions of tense and energetic arousal (Thayer, 2000) when expressed in polar rather than Cartesian coordinates (Rafaeli & Revelle, 2006). Circumplex theorists tend to reject any fundamental rotation of axes, but when describing the interpersonal circumplex prefer to use dominance (agency) and love (communion). These circumplex models may be generalized by projecting higher dimensional models into sets of two dimensional circumplexes. For instance, many of the items describing the "Big 5" may be represented in circumplexes of pairs of dimensions (Hofstee, Raad, & Goldberg, 1992).

Subsequent blending of affective, behavioral, and interpersonal descriptions of individual differences led to descriptive taxonomies using such colloquial terms of power and leadership, affection, productivity in work, sensitivity to emotion and interest in intellectual ideas or to the more technical dimensions of extraversion, agreeableness, conscientiousness, neuroticism and openness discussed by "Big 5" theorists. The "Big 5" are said to have become consensual descriptions of the important domains of behavior (Digman, 1990; Goldberg, 1990). But saying there are five orthogonal factors does not make it so. These domains are not independent (DeYoung, 2010; Digman, 1997) nor universally accepted (Block, 1995, 2010; McAdams & Pals, 2006; McAdams & Walden, 2010; Revelle, 1995).

Two higher order factors of the "Big 5" were introduced by Digman (1997) who suggested that the first (dubbed α) factor was associated with good socialization (higher levels of agreeableness, conscientiousness, and emotional stability) while the second (β) dimension was associated with personal growth (extraversion/surgency and intellect/openness to experience). More recently, DeYoung (2010) has proposed that Digman's α and β dimensions have biological bases associated with serotonin and dopamine and are better labeled as stability and plasticity.

Bogdan Wojciszke and his colleagues (Abele & Wojciszke, 2007; Wojciszke, this volume) study the interpersonal dimensions of *agency* and *communion* dimensions in their analysis of social information processing. They consider the higher order structure of the "Big 5" proposed by Digman (1997) and suggest that α and β dimensions should be interpreted as agency and communion. For them, agency is goal pursuit for the self, communion is a desire for integrating with others. Differences in goals naturally leads to different behavioral outcomes.

By adding *social goals* to the personality agenda, Wojciszke (this volume) has made a very important contribution. For too much of personality description and theory is at the intrapersonal level, considering how people react to cues for punishment and rewards, how they seek stimulation, how they inhibit behavior in the face of threats. But humans are social animals and it is the complex interplay of people with each other that leads group

cohesion and ultimately to survival. Extraversion, for instance, is partly enjoying being with people, but it is also a desire for social dominance. Positive aspects of agreeableness are associated with positive affect when dealing with others, while the disagreeable end of the spectrum is more associated with desires to impress others, achieve more power, and use flattery to get ahead. Whether the most useful level of analysis is at the two dimensions of agency and communion is not the question, but Wojciszke (this volume) makes clear that the addition of considering peoples' interpersonal goals is vital for our understanding of how people deal with others.

Cognition and Desire

Our goals and desires affect not just our actions but also the way we think and feel. The effect of goal direction on creative processes in thinking and emotion is examined by Alina Kolańczyk (this volume) who uses the meta-motivational concepts of Apter (1984, 2001) to examine how playful (paratelic) versus focused (telic) goals affect intuition and creative problem solving. Kolańczyk considers how motivational state affect the allocation and breadth of attention. Compared to a telic motivational state, attentional processes are broader and shallower than when in a paratelic motivational state. With the proper background knowledge and experience, this broader attention can lead to more intuitive and creative problem solving than when attention is more focused on narrower and deeper specific problems. The telic and paratelic states are thought of as meta-motivational in that they are not immediately goal directed, but rather determine the manner in which the goal is achieved. Although originally conceived as motivational states (Apter, 1984) individual differences in the frequency of being in these states has taken on a more trait like perspective (Apter, 2001).

Other meta-motivational constructs include promotion and prevention focus (Higgins, 1998; Liberman, Molden, Idson, & Higgins, 2001) which can either be seen as state specific or as more trait like. It is intriguing that although these metamotivations (e.g., telic vs. paratelic, promotion and prevention focus) were introduced as state variables, much of the analysis has been done upon them as more trait like.

Affect and Desire

Basic theories of reinforcement learning emphasize the affective reaction to rewards and punishments as well as differential sensitivities to cues for these rewards and punishments (Corr, 2008; Gray & McNaughton, 2000). But affects do not occur just in response to situational reinforcers, they also are responses to our rates of approach to our goals (Carver & Scheier, 2000). Typically studied goals are as simple as food and sex, or somewhat more complicated such as achievement and accomplishment. But humans also have goals and aspirations to behave in good and moral ways. Unfortunately, these goals are frequently not met. When we behave in ways that violate our basic ethical or moral standards we feel shame and guilt. Although frequently confused, these two emotions are very different, not

just in the eliciting situations, but also in their consequences (Tangney, Malouf, Stuewig, & Mashek, this volume). The experience of shame is associated with higher levels of neuroticism and reflects feelings about bad feelings about one's self. Feelings of guilt, on the other hand, are more associated with agreeableness, and reflect a focus on one's behavior.

Reacting with shame or with guilt is not just a consequence of a focus on self or on behavior, for these two emotions also change ones immediate desires and motivations. "Shame motivates attempts to deny, hide or escape ... guilt motivates reparative action – confessing, apologizing, undoing" (Tangney et al., this volume, p x). People who are more susceptible to feelings of shame are also more susceptible to anger. This is true across subjects but also within, that is when feeling shame one also feels anger, but less so when feeling guilt (Tangney, Miller, Flicker, & Barlow, 1996). These different emotions also have implications for future desires. Those who are guilt prone are more likely to anticipate future pangs of guilt and set themselves goals to avoid acting in a way that will induce the emotion. Shame prone, on the other hand seem less able to set appropriate future goals.

Affect and Behavior

How one feels affects what one does. That behavior is a cue to internal emotional and cognitive states can have serious negative repercussions. Consider the work of Book and Wheeler and their colleagues showing that the way a person walks is a cue of vulnerability to being a victim. Psychopaths can be shown to be particularly sensitive to these cues (Book, Quinsey, & Langford, 2007; Wheeler, Book, & Costello, 2009). Thus, the complex interplay of the emotions we show in our behaviors affects those who are sensitive to these behavioral cues and allow them to prey upon the most vulnerable.

In a very thoughtful analysis of the complexity of emotions, Nico Frijda (this volume) considered "how emotions work". For Frijda, emotions are multicomponential phenomena that are best viewed as passions. They are not responses per se, but are rather tendencies to act. They are "states that clamor for action or impose inaction". His analysis was very compatible with that discussed by Nęcka (e.g., Chuderski & Nęcka, 2010) who considers executive control as a process of organizing actions when faced with multiple goals that were often incongruous or mutually exclusive. For Nęcka, we must consider both the horizontal and the vertical control of action. Horizontally refers to the queuing of actions in time and the setting of priorities with the appropriate triggering of actions. Vertically refers to ones hierarchy of actions. One can have one goal which is achieved through many actions as well as one action that achieves many goals.

Both Nęcka and Frijda's analysis are reminiscent of the work by Atkinson & Birch (1970) on the dynamics of action (DOA). The DOA introduced the dimension of time to the analysis of motivational strength and direction. The fundamental idea was that analysis of choice, persistence, latency, frequency and time spent can be done in a common framework: the analysis of actions over time. E.g., the initiation of an activity should be analyzed in the same manner as the persistence of an activity, for the latency of onset of

an activity is equivalent to the the persistence of not doing that activity. This was a model with many different motivational states running off in parallel but producing a single chain of behavioral outcomes.

The dynamics of action was a model of how *instigating forces* elicited *action tendencies* which in turn elicited *actions*. The basic concept was that action tendencies had *inertia*. This was an outgrowth of earlier work by Gestalt psychologists influenced by Kurt Lewin (e.g., Zeigarnik, 1927/1967) as well as Feather (1961) and Atkinson & Cartwright (1964). In simple terms, a wish persists until satisfied and a wish does not increase unless instigated. (This is, of course, a restatement of Newton's 1st law of motion that a body at rest will remain at rest, a body in motion will remain in motion). By considering motivations and actions to have inertial properties it became possible to model the onset, duration, and offset of activities in terms of a simple set of differential equations. The consummatory strength of doing an action was thought in turn to reduce the action tendency. Forces could either be instigating or inhibitory (leading to *negaction*).

The relationship between instigating forces (F), changes in action tendencies over time (dT), and the expression of actions (T) themselves was described by a simple differential equation (reminiscent of Newton's second law)

$$dT = F - CT$$

where

$$C = cT$$

and c = 0 if an action is not being done, otherwise c is a function of the type of action (eating peanuts has a smaller c than eating chocolate cake).

That is for a set of action tendencies, T, with instigating forces, F,

$$\begin{cases} dT_i = F_i - c_i T_i & \text{if } T_i \text{ is ongoing} \\ dT_A = F_A & \text{if } T_i \text{ is not ongoing} \end{cases}$$

Unfortunately, the theory of the Dynamics of Action was a theory before its time. With the exception of those who understood control theory (e.g., Carver & Scheier, 1982; Toates, 1975) few psychologists of the 1970s and 1980s were prepared to understand differential equations or to do computer modeling of difference equations. However, with a simple reparameterization and modern software and computational power, the model is much easier to simulate and examine. Applications of the revised model may be extended to the dynamics of emotion (e.g., Frijda, this volume) as well as to social behavior. The "Cues-Tendencies-Action" (CTA) model (Revelle, 1986) considers environmental Cues to instigate action Tendencies which in turn lead to Actions.

Rather than specifying inertia just for action tendencies and a choice rule of always expressing the dominant action tendency, thinking of actions themselves also as having inertial properties leads to a simpler model. In an environment which cues for action (**C**),

cues enhance action tendencies (**T**) which in turn strengthen actions (**A**). This leads to two differential equations, one describing the growth and decay of action tendencies (**T**), the other of the actions themselves (**A**).

$$d\mathbf{T} = \mathbf{sC} - \mathbf{cA} \tag{1}$$

$$d\mathbf{A} = \mathbf{eT} - \mathbf{iA} \tag{2}$$

There are several interesting implications of incorporating inertial properties into our theories. Perhaps the primary implication from a personality perspective is that trait stability is seen in the rates of change in affect and cognitive states. In the DOA/CTA model, traits act as coefficients in Equations 1 and 2, Thus, sensitivity (s) to environmental cues (C) as well as rates of consummation (c) from doing an action, the strength of association (e) between a tendency and an action, and the inhibitory connections (i) between actions are all individual differences parameters.[1]

While tendencies may rise and fall independently, actions are frequently mutually incompatible and thus occur sequentially. There is no need for a homunculus to make decisions between action tendencies, for actions themselves are mutually incompatible. Perhaps the most vivid example of conflicting needs affecting the patterning of behavior is sexual behavior (which occurs underwater) for the air breathing newt. Increasing the amount of oxygen available at the surface for breathing prolongs underwater sexual bouts (Halliday, 1980; Halliday & Houston, 1991), Perhaps a less dramatic example of competing needs is being at a reception following a scientific convention. That is, while optimizing one goal (paying attention to what a colleague is saying) which is compatible with another goal (slacking one's thirst with a beer), one is not optimizing another goal (the growing need to micturate given all that beer). For both the newt and the scientist, dynamic models predict alteration of behaviors even in a stable environment.

This complex stream of affect, desire, thought and behavior while satisfying a desire is just one example of why Frijda (this volume) believes that emotion cannot be adequately defined, for a fully fledged emotion is a continuous mixture of all of these elements.

Conclusion

The conference summarized in these chapters had the ambitious goal of providing a forum for those interested in integrating theories of personality with those of cognition and affect. The authors of the papers presented at the symposium and the chapters in this volume strove towards that goal. The coherent themes from the meeting formed a whole that was far more than a mere sum of the details. All participants appreciated the effort of the organizers as well as of their fellow participants.

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[1]To allow researchers to explore the applications of this model, computer code simulating the revised model is available in the `cta` function in the *psych* package (Revelle, 2011) which is written in the open source language R, (R Development Core Team, 2011). Applications of this dynamic model have been used to simulate behavioral and emotional expression in the interactions of several children and adults in a playground (Fua, Horswill, Ortony, & Revelle, 2009; Fua, Revelle, & Ortony, 2010).

References

Abele, A. E., & Wojciszke, B. (2007). Agency and communion from the perspective of self versus others. *Journal of Personality and Social Psychology*, *93*(5), 751-763.

Anderson, K. J., & Revelle, W. (1982). Impulsivity, caffeine, and proofreading: A test of the Easterbrook hypothesis. *Journal of Experimental Psychology: Human Perception and Performance*, *8*(4), 614-624.

Apter, M. J. (1984). Reversal theory and personality: A review. *Journal of Research in Personality*, *18*(3), 265-288.

Apter, M. J. (Ed.). (2001). *Motivational styles in everyday life: a guide to reversal theory.* Washington, D.C.: American Psychological Association.

Atkinson, J. W., & Birch, D. (1970). *The dynamics of action.* New York, N.Y.: John Wiley.

Atkinson, J. W., & Cartwright, D. (1964). Some neglected variables in contemporary conceptions of decision and performance. *Psychological Reports*, *14*, 575-590.

Barrett, L., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, *74*(4), 967-984.

Block, J. (1995). A contrarian view of the five-factor approach to personality description. *Psychological Bulletin*, *117*(2), 187-215.

Block, J. (2010). The Five-Factor framing of personality and beyond: Some ruminations. *Psychological Inquiry*, *21*(1), 2-25.

Blodgett, H. (1929). The effect of the introduction of reward upon the maze performance of rats. *University of California Publications in Psychology*, *4*, 113-134.

Bodenhausen, G. V. (1990). Stereotypes as judgmental heuristics: Evidence of circadian variations in discrimination. *Psychological Science*, *1*(5), 319-322.

Book, A. S., Quinsey, V. L., & Langford, D. (2007). Psychopathy and the perception of affect and vulnerability. *Criminal Justice and Behavior*, *34*(4), 531-544.

Broadbent, D. (1971). *Decision and stress.* London: Academic Press.

Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality-social, clinical, and health psychology. *Psychological Bulletin*, *92*(1), 111-135.

Carver, C. S., & Scheier, M. F. (2000). *Origins and functions of positive and negative affect: A control-process view.* New York, NY: Psychology Press.

Chuderski, A., & Nęcka, E. (2010). Intelligence and cognitive control. In A. Gruszka, G. Matthews, & B. Szymura (Eds.), *Handbook of individual differences in cognition: Attention, memory and executive control* (p. 263-282). New York: Springer.

Cooper, R. M., Rowe, A. C., Penton-Voak, I. S., & Ludwig, C. (2009). No reliable effects of emotional facial expression, adult attachment orientation, or anxiety on the allocation of visual attention in the spatial cueing paradigm. *Journal of Research in Personality*, *43*(4), 643 - 652.

Corr, P. J. (2008). Reinforcement Sensitivity Theory (RST): Introduction. In P. J. Corr (Ed.), *The reinforcement sensitivity theory of personality.* Cambridge: Cambridge University Press.

Corr, P. J., & Fajkowska, M. (2011). Introduction to special issue on anxiety. *Personality and Individual Differences*, *50*(7), 885 - 888. (Special Issue on Anxiety dedicated to the memory of Professor Blazej Szymura)

Derakshan, N., & Eysenck, M. W. (2009). Anxiety, processing efficiency, and cognitive performance: New developments from attentional control theory. *European Psychologist*, *14*(2), 168 - 176. Available from http://search.ebscohost.com.turing.library.northwestern.edu/login.aspx?direct=true&db=pdh&AN=epp-14-2-168&site=ehost-live

DeYoung, C. G. (2010). Toward a theory of the big five. *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, *21*(1), 26 - 33.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology.*, *41*, 417-440.

Digman, J. M. (1997). Higher-order factors of the big five. *Journal of Personality and Social Psychology*, *73*, 1246-1256.

Easterbrook, J. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review*, *66*, 183-20.

Eysenck, H. J. (1952). *The scientific study of personality.* London,: Routledge & K. Paul.

Eysenck, H. J. (1967). *The biological basis of personality.* Springfield: Thomas.

Eysenck, M. W. (1979). Anxiety, learning, and memory: A reconceptualization. *Journal of Research in Personality*, *13*(4), 363-385.

Eysenck, M. W. (2000). A cognitive approach to trait anxiety. *European Journal of Personality*, *14*(5), 463-476.

Eysenck, M. W. (this volume). Anxiety and cognitive performance. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* (Vol. 2). New York, NY US: Eliot Werner Publications.

Eysenck, M. W., & Derakshan, N. (2011). New perspectives in attentional control theory. *Personality and Individual Differences*, *50*(7), 955–960.

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, *7*(2), 336-353.

Eysenck, M. W., Lister, R. G., & Weingartner, H. J. (1991). Anxiety and cognitive functioning: A multifaceted approach. In *Perspectives on cognitive neuroscience.* (p. 314-324). New York, NY US: Oxford University Press.

Feather, N. T. (1961). The relationship of persistence at a task to expectation of success and achievement related motives. *Journal of Abnormal and Social Psychology*, *63*, 552-561.

Fleeson, W. (2001). Toward a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology*, *80*(6), 1011-1027.

Fleeson, W. (2007). Studying personality processes: Explaining change in between-persons longitudinal and within-person multilevel models. *Handbook of research methods in personality psychology*, 523–542.

Frijda, N. H. (this volume). How emotions work. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* (Vol. 2). New York, N.Y.: Eliot Werner Publications.

Fua, K., Horswill, I., Ortony, A., & Revelle, W. (2009, November). Reinforcement sensitivity theory and cognitive architectures. In *Biologically informed cognitive architectures (bica-09).* Washington, D.C..

Fua, K., Revelle, W., & Ortony, A. (2010). Modeling personality and individual differences: the approach-avoid-conflict triad. In *Cogsci 2010: The annual meeting of the Cognitive Science Society, Portland, Or.*

Funder, D. C. (2006). Towards a resolution of the personality triad: Persons, situations, and behaviors. *Journal of Research in Personality*, *40*(1), 21-34.

Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local processing of visual information. *Psychological Science*, *13*(1), 34-40.

Goldberg, L. R. (1990). An alternative "description of personality": The big-five factor structure. *Journal of Personality and Social Psychology*, *59*(6), 1216-1229.

Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), *A model for personality* (p. 246-277). Berlin: Springer.

Gray, J. A. (1982). *Neuropsychological theory of anxiety: An investigation of the septal-hippocampal system.* Cambridge: Cambridge University Press.

Gray, J. A. (1991). The neuropsychology of temperament. In J. Strelau & A. Angleitner (Eds.), *Explorations in temperament: International perspectives on theory and measurement* (p. 105-128). New York, NY: Plenum Press.

Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system* (2nd ed.). Oxford: Oxford University Press.

Gurtman, M. B. (1994). The circumplex as a tool for studying normal and abnormal personality: A methodological primer. In S. Strack & M. Lorr (Eds.), *Differentiating normal and abnormal personality* (p. 243-263). New York, NY: Springer.

Gurtman, M. B. (1997). Studying personality traits: The circular way. In R. Plutchik & H. R. Conte (Eds.), *Circumplex models of personality and emotions* (p. 81-102). Washington, DC: American Psychological Association.

Halliday, T. R. (1980). Motivational systems and interactions between activities. In F. M. Toates & T. R. Halliday (Eds.), *Analysis of motivational processes* (p. 205-220). London: Academic Press.

Halliday, T. R., & Houston, A. I. (1991). How long will newts wait? an experiment to test an assumption of a causal model of the courtship of the male smooth newt, triturus v. vulgaris. *Behaviour*, *116*(3/4), 278–291.

Herbert, R. L., Seurat, G., & Art Institute of Chicago the. (2004). *Seurat and the making of la grande jatte.* Chicago: Art Institute of Chicago.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), (Vol. 30, p. 1 - 46). Academic Press.

Hilgard, E. R. (1980). The trilogy of mind: Cognition, affection, and conation. *Journal of the History of the Behavioral Sciences*, *16*, 107-117.

Hofstee, W. K., Raad, B. de, & Goldberg, L. R. (1992). Integration of the big five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology*, *63*(1), 146-163.

Humphreys, M. S., & Revelle, W. (1984). Personality, motivation, and performance: A theory of the relationship between individual differences and information processing. *Psychological Review*, *91*(2), 153-184.

Kolańczyk, A. (this volume). Building bridges in psychology as exemplified by creative intuition. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* New York, N.Y.: Eliot Werner Publications.

Leary, T. (1957). *Interpersonal diagnosis of personality.* New York: Ronald Press.

Leon, M. R., & Revelle, W. (1985). Effects of anxiety on analogical reasoning: A test of three theoretical models. *Journal of Personality and Social Psychology*, *49*(5), 1302-1315.

Liberman, N., Molden, D. C., Idson, L. C., & Higgins, E. T. (2001). Promotion and prevention focus on alternative hypotheses: Implications for attributional functions. *Journal of Personality and Social Psychology*, *80*(1), 5-18.

MacKinnon, D. P. (2008). *Introduction to statistical mediation analysis.* New York, NY US: Lawrence Erlbaum Associates Taylor & Francis Group.

MacLean, P. D. (1990). *The triune brain in evolution: role in paleocerebral functions.* New York: Plenum Press.

MacLean, P. D., & Kral, V. A. (1973). *A triune concept of the brain and behaviour.* Toronto: University of Toronto Press.

Matthews, G., Campbell, S. E., Falconer, S., Joyner, L. A., Huggins, J., Gilliland, K., et al. (2002). Fundamental dimensions of subjective state in performance settings: Task engagement, distress, and worry. *Emotion*, *2*(4), 315 - 340.

Matthews, G., & Fellner, A. N. (this volume). The energetics of emotional intelligence. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* (Vol. 2). New York, NY US: Eliot Werner Publications.

Matthews, G., Panganiban, A. R., & Hudlicka, E. (2011). Anxiety and selective attention to threat in tactical decision-making. *Personality and Individual Differences*, *50*(7), 949–954.

Matthews, G., Zeidner, M., & Roberts, R. D. (Eds.). (2002). *Emotional intelligence: Science and myth.* Cambridge, Mass.: A Bradford Book: MIT Press.

Mayer, J. D. (2001). Primary divisions of personality and their scientific contributions: From the trilogy-of-mind to the systems set. *Journal for the Theory of Social Behaviour*, *31*(4), 449-477.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) item booklet.* Toronto, Ontario, Canada: MHS Publishers.

Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion*, *3*(1), 97 - 105.

McAdams, D. P. (2008). Personal narratives and the life story. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., p. 242-262). New York, NY: Guilford Press.

McAdams, D. P., & Pals, J. L. (2006). A new big five: Fundamental principles for an integrative science of personality. *American Psychologist*, *61*(3), 204-217.

McAdams, D. P., & Walden, K. (2010). Jack Block, the Big Five, and personality from the standpoints of actor, agent, and author. *Psychological Inquiry*, *21*(1), 50-56.

Nęcka, E. (2000). Intelligence, cognitive strategies, and arousal: Can we control non-cognitive factors that influence our intellect. In U. Hecker, S. Dutke, & G. Sedek (Eds.), *Generative mental processes and cognitive resources* (p. 95-122). the Netherlands: Kluwer Academic Publishers.

Neshat-Doost, H. T., Dalgleish, T., & Golden, A.-M. J. (2008). Reduced specificity of emotional autobiographical memories following self-regulation depletion. *Emotion*, *8*(5), 731 - 736. Available from http://search.ebscohost.com.turing.library.northwestern.edu/login.aspx?direct=true&db=pdh&AN=emo-8-5-731&site=ehost-live

Oatley, K. (2009). Communications to self and others: Emotional experience and its skills. *Emotion Review*, *1*(3), 206-213.

Oatley, K. (this volume). Emotions in the individual mind, in relationships, and in reading fiction. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* (Vol. 2). New York, NY US: Eliot Werner Publications.

Oehlberg, K. A., Revelle, W., & Mineka, S. (in press). Time-course of attention to negative stimuli: Negative affectivity, anxiety, or dysphoria. *Emotion*.

Ortony, A., Norman, D. A., & Revelle, W. (2005). Affect and proto-affect in effective functioning. In J. Fellous & M. Arbib (Eds.), *Who needs emotions? The brain meets the machine.* (p. 173-202). New York: Oxford Univeristy Press.

Ortony, A., Revelle, W., & Zinbarg, R. (2007). Why emotional intelligence needs a fluid component. In G. Matthews, M. Zeidner, & R. D. Roberts (Eds.), *The science of emotional intelligence: Knowns and unknowns.* (p. 288-304). New York, NY: Oxford University Press.

Pelli, D. G. (1999). Close encounters–an artist shows that size affects shape. *Science*, *285*(5429), 844-846.

R Development Core Team. (2011). R: A language and environment for statistical computing [Computer software manual]. Vienna, Austria. Available from http://www.R-project.org/ (ISBN 3-900051-07-0)

Rafaeli, E., & Revelle, W. (2006). A premature consensus: Are happiness and sadness truly opposite affects? *Motivation and Emotion*, *30*(1), 1-12.

Rafaeli, E., Rogers, G. M., & Revelle, W. (2007). Affective synchrony: Individual differences in mixed emotions. *Personality and Social Psychology Bulletin*, *33*(7), 915-932.

Reisenzein, R. (1992). A structuralist reconstruction of wundt's three dimensional theory of emotion. In H. Westmeyer (Ed.), *The structuralist program in psychology: Foundations and applications* (p. 141-189). Toronto: Hogrefe & Huber Publishers.

Revelle, W. (1986). Motivation and efficiency of cognitive performance. In D. R. Brown & J. Veroff (Eds.), *Frontiers of motivational psychology: Essays in honor of J. W. Atkinson* (p. 105-131). New York: Springer.

Revelle, W. (1995). Personality processes. *Annual Review of Psychology*, *46*, 295-328.

Revelle, W. (2011). psych: Procedures for personality and psychological research [Computer software manual]. Evanston. Available from http://personality-project.org/r (R package version 1.1.09)

Revelle, W., Wilt, J., & Condon, D. (2011). Individual differences and differential psychology: A brief history and prospect. In A. F. Tomas Chamorro-Premuzic & S. von Stumm (Eds.), *Handbook of individual differences* (p. 3-38). Oxford: Wiley-Blackwell.

Richeson, J. A., & Shelton, J. N. (2003). When prejudice does not pay: Effects of interracial contact on executive function. *Psychological Science*, *14*(3), 287-290.

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161-1178.

Russell, J. A., Lewicka, M., & Niit, T. (1989). A cross-cultural study of a circumplex model of affect. *Journal of Personality and Social Psychology*, *57*(5), 848-856.

Scherer, K. (1995). Plato's legacy: Relationships between cognition, emotion, and motivation. *Geneva Studies in Emotion and Communication*, *9*(1), 1-7.

Schimmack, U., & Reisenzein, R. (2002). Experiencing activation: Energetic arousal and tense arousal are not mixtures of valence and activation. *Emotion*, *2*(4), 412-417.

Spence, K., Farber, I., & McFann, H. (1956). The relation of anxiety (drive) level to performance in competitional and non-competitional paired-associates learning. *Journal of Experimental Psychology*, *52*, 296-305.

Stöber, J., & Pekrun, R. (2004). Advances in test anxiety (editorial). *Anxiety, Stress, & Coping*, *17*(3), 205-211.

Storr, R., Close, C., Varnedoe, K., & Wye, D. (1998). *Chuck Close.* New York, NY: Museum of Modern Art.

Strelau, J. (1987). Emotion as a key concept in temperament research. *Journal of Research in Personality*, *21*(4), 510-528.

Strelau, J. (1998). *Temperament: A psychological perspective.* New York, NY: Plenum Press.

Tangney, J. P., Malouf, E., Stuewig, J., & Mashek, D. (this volume). Emotions and morality: You don't have to feel really bad to be good. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* New York, N.Y.: Eliot Werner Publications.

Tangney, J. P., Miller, R. S., Flicker, L., & Barlow, D. H. (1996). Are shame, guilt, and embarrassment distinct emotions? *Journal of Personality and Social Psychology*, *70*(6), 1256–1269.

Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A. H. Turna & J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (p. 681-706). Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.

Tellegen, A., Watson, D., & Clark, L. A. (1999). On the dimensional and hierarchical structure of affect. *Psychological Science*, *10*(4), 297-303.

Thayer, R. E. (1989). *The biopsychology of mood and arousal.* The biopsychology of mood and arousal. xi, 234 pp. New York, NY: Oxford University Press.

Thayer, R. E. (2000). *Mood* (A. E. Kazdin, Ed.). (2000). Encyclopedia of psychology, Vol. 5. (pp. 294-295). Washington, DC ; New York, NY: American Psychological Association; Oxford University Press 508 pp.

Toates, F. M. (1975). *Control theory in biology and experimental psychology.* London: Hutchinson Educational Ltd.

Tolman, E. C., & Honzik, C. (1930). Introduction and removal of reward, and maze performance in rats. *University of California Publications in Psychology*, *4*, 257-275.

Wachtel, P. L. (1973). Psychodynamics, behavior therapy, and the implacable experimenter: An inquiry into the consistency of personality. *Journal of Abnormal Psychology*, *82*(2), 324 - 334. Available from http://search.ebscohost.com.turing.library.northwestern.edu/login.aspx?direct=true&db=pdh&AN=abn-82-2-324&site=ehost-live

Weiner, B., & Schneider, K. (1971). Drive vs. cognitive theory: A reply to Boor and Harmon. *Journal of Personality and Social Psychology*, *8*, 258-262.

Wheeler, S., Book, A., & Costello, K. (2009). Psychopathic traits and perceptions of victim vulnerability. *Criminal Justice and Behavior*, *36*(6), 635-648.

Wichary, S., Domaradzka, E., & Sędek, G. (this volume). Cognitive aging and integration in reasoning and decision making. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* (Vol. 2). New York, NY US: Eliot Werner Publications.

Wiggins, J. S. (1996). An informal history of the interpersonal circumplex tradition. *Journal of Personality Assessment*, *66*(2), 217-233.

Wilt, J., Funkhouser, K., & Revelle, W. (2011). The dynamic relationships of affective synchrony to perceptions of situations. *Journal of Research in Personality*, *45*, 309–321.

Wilt, J., Oehlberg, K., & Revelle, W. (2011). Anxiety in personality. *Personality and Individual Differences*, *50*(7), 987-993.

Wilt, J., & Revelle, W. (2009). Extraversion. In M. Leary & R. H. Hoyle (Eds.), *Handbook of individual differences in social behavior* (p. 27-45). New York, N.Y.: Guilford Press.

Wine, J. (1971). Test anxiety and direction of attention. *Psychological Bulletin*, *76*(2), 92-104.

Wojciszke, B. (this volume). Agency and communion as basic dimensions of social cognition. In M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality, cognition and emotion. warsaw lectures in personality and social psychology.* (Vol. 2). New York, NY US: Eliot Werner Publications.

Woodworth, R. S., & Schlosberg, H. (1954). *Experimental psychology* (Rev. ed.). New York: Holt.

Wundt, W. (1904). *Principles of physiological psychology* (Translated from the Fifth German Edition (1902) ed.). London: Swan Sonnenschein.

Yerkes, R., & Dodson, J. (1908). The relation of strength of stimuli to rapidity of habit-information. *Journal of Comparative Neurology and Psychology*, *18*, 459-482.

Zeelenberg, M., Nelissen, R. M. A., Breugelmans, S. M., & Pieters, R. (2008). On emotion specificity in decision making: why feeling is for doing. *Judgment and Decision Making*, *3*(1), 18-27.

Zeigarnik, B. (1927/1967). On finished and unfinished tasks. In W. D. Ellis (Ed.), *A source book of Gestalt psychology (reprinted and translated from Psychological Forschung, 1927, 9, 1-85).* New York: Harcourt Brace.