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Degrees of complexity and flexibility in the belief system and the strength of identity attachment to belief claims

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DEGREES OF COMPLEXITY AND FLEXIBILITY IN THE BELIEF SYSTEM AND THE STRENGTH OF IDENTITY ATTACHMENT TO BELIEF CLAIMS

A Thesis

Presented to the

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by

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ABSTRACT

Partial support was found for the hypothesis that complexity and flexibility make unique but related contributions to the connection between belief system structure and self structure. 95 undergraduate psychology students at California State University San Bernardino were given three scales, Need For Cognition (NFC), Dogmatism (DOG) and the Epistemological Belief Survey (EBS), and preformed a card sort task developed to assess self structure, complexity, and stability. The scales were combined to provide a measure of belief system complexity and flexibility and then correlated with the card sort results. Regression analysis revealed NFC, a measure of cognitive complexity, and the certain knowledge dimension of the EBS, a factor that indicates belief system flexibility, made significant unique contributions to the complexity of self structure, as measured by the card sort task.

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CHAPTER ONE

INTRODUCTION SUMMARY

Introduction

In 1637 Descartes begins his famous work, Discourse on Method and Meditation on First Philosophy by doubting everything. "In the first Meditation, I set forth the reasons for which we may, generally speaking, doubt about all things and especially about material things" (Weissman, 1996, p. 55). Descartes brings into doubt the report of his senses "All that up to the present time I have accepted as most true and certain I have learned either from the sense or through the senses; but it is sometimes proved to me that these senses are deceptive" (Weissman, 1996, p. 59). Pursuing his doubts further he cites the profound sense of reality one feels when they are dreaming; "…there are no certain indications by which we may clearly distinguish wakefulness from sleep that I am lost in astonishment. And my astonishment is such that it is almost capable of persuading me that I now dream" (Weissman, 1996 p. 60). This profound, even exaggerated, form of doubting is not unique to Descartes, or even 17th century Europe. Roughly

five-hundred years B.C. in China, Chuang Tzu of the Taoist religion mused; "he dreamed he was a butterfly, now awake he wondered if he were not a butterfly dreaming he was Chuang Tzu" (Smith, 1958 p. 212).

Both Descartes and the Taoist were concerned with reality and the nature of truth (Smith, 1958; Weissman, 1996). Plato too, a near contemporary to Chuang Tzu in the West, put forth his Allegory of the Cave; - an attempt to reveal the difficulty in knowing the true from the false. Only through acceptance of profound doubt does one come to distinguish true reality from the shadow of reality (Jacobus, 2002). In all these classic illustrations there is a struggle to grasp reality, an effort to make "truth" knowable, and a capacity to doubt what one believes. In all three cases, what is thought or believed to be true is first brought under doubt and scrutiny.

This readiness to criticize one's beliefs is in surprisingly short supply in contemporary societies. Consider the following selection of a transcript from the *O'Reilly Factor* talk show. The host Bill O'Reilly, and his guest, the political commentator Dick Morris, are discussing the war in Iraq and the role of the media.

MORRIS: Their vested interest is in trying to assure a failure in Iraq. They are just like that congressman.

O'REILLY: Why?

MORRIS: Because they are liberal and they want to win the election of 08. They want to do that by minimizing the perception of terror and maximize the perception of failure.

O'REILLY: You are 100 percent sure that the media in the United States will not report the situation in Iraq honestly because they want a Democratic president?

MORRIS: Of course.

O'REILLY: You're 100 percent sure of that.

MORRIS: Yes, I am also sure it might snow this winter. Of course. It is obvious. That is the way they are. We have a media that goes into politics with their own opinion and tries hard to do it.

(Tabacoff, 2007)

The contrast between Descartes' ever-present doubts about everything and the complete certainty of Morris is astonishing. Even still, modern man may smile knowingly at the unsophisticated naiveté of Descartes and the other

ancient thinkers; how more vast is our understanding and knowledge today. Our modern confidence may fade, however, as science attempts to explain seemingly ordinary phenomena. Here is an explanation of time by the renowned physicist Stephen Hawking (1988).

> The increase of disorder or entropy with time is one example of what is called an arrow of time, something that distinguishes the past from the future, giving a direction to time. There are at least three arrows of time. First, there is the thermodynamic arrow of time, the direction to time which is disorder or entropy increases. Then, there is the psychological arrow of time. This is the direction in which we feel time passes, the direction in which we remember the past but not the future. Finally, there is the cosmological arrow of time. This is the direction of time in which the universe is expanding rather than contracting (p. 145).

The above example hints that our modern arrogance may be misplaced. Time, for most of us, is a straightforward linear experience, where as according to Hawking, time is something barely intelligible. To accept the Hawking description of time requires a mental willingness to let go

of the more simple view of time as experienced from our wrist watch.

This thesis is concerned with how the mind organizes beliefs in its interactions with the world, while also maintaining stability across the belief system and continuity in one's sense of identity, both of which can be at odds with ones sense of reality. The individual's view of reality is typically adaptive. The need to maintain stability and preserve identity will often trump accuracy. Extreme examples of the adaptive nature of obviously inaccurate beliefs are described by Oliver Sacks in his touching narratives of case studies compiled in *The Man Who Mistook His Wife for a Hat*. Sacks describes an assortment of neurological disorders - disorders of losses, of excesses, of transportations to forgotten pasts, of nostalgic reminiscence, and of bizarre visual auditory and olfactory experience. In each case the patient attempts to compensate for their situation. Many are completely unaware of their circumstances, and thus unaware of their (or their nervous systems') means of compensation; they hold beliefs as fantastic and unreal as Chuang Tzu's butterfly dream, and as nebulous as Hawking's description of time. Sacks states:

> But it must be said from the outset that a disease is never a mere loss or excess - that there is always a reaction, on the part of the affected organism or individual, to restore, to replace, to compensate for and to preserve its identity, however strange the means may be (1987; p 6).

As the Sacks' citation indicates, beliefs are often surprisingly immune to revision despite overwhelming evidence. Absolute certainty in our beliefs can be a rigid obstacle to understanding. Sacks' case studies show how identity, perception, and belief formation are all inter-related.

There is always a tension between the need to bring belief in line with reality - to adjust belief to new information and understanding - and needs for internal consistency and stability within and across the belief system, along with the continued integrity of the self. Stability, continuity, and consistency provide psychological and social security. However, a belief system that overemphasizes stability and rejects new information and understanding may depart too far from an accurate, truthful construction of reality, risking the very stability it endeavors to maintain.

Summary Preview

This thesis explores three general points in preparation for the hypotheses. First, the belief system is constructed of unique but interrelated parts, "belief claims", and maintained by two features: complexity and flexibility. The belief claims cluster in a cognitive field or grid of "depth" and "breadth". Complexity and flexibility are semi-independent dimensions that operate within the depth and breadth field, and range from low to high. The belief claim relationship to complexity is in regards to size, detail, and context; while the relationship to flexibility is in regards to movement and interchangeability. Complexity gives rise to flexibility which in turn makes greater complexity possible.

Second, the purpose of the belief system is to create stability and meaning in a person's sense of reality. The sense of stability and meaning is maintained by two general paths, one is truth preservation; the other is belief defensiveness. In both cases it is the belief system structure that determines which path is adapted; if the belief claim configurations exhibit high degrees of complexity and flexibility, then the truth preservation path is more likely, where as if the belief claim

configurations exhibit lower degrees of complexity and flexibility, then the belief defensiveness path is more likely. In the case of truth preservation, high complexity/flexibility allows belief claim configurations to be restructured in an effort to accommodate and better integrate both congruent and incongruent experiences and data. In the case of belief defensiveness, low complexity and flexibility result in belief claim configurations that easily integrate belief congruent data, but require a great deal of cognitive effort to restructure when belief incongruent data are encountered.

Belief defensiveness divides further into cognitive maintenance, and ego protection. Cognitive maintenance is an effort to lower the cognitive load required to restructure the belief system by refuting belief incongruent data in an effort to keep the current belief system intact. Closely related, ego protection results from a low complexity/flexibility belief system because, in such a system, the identity is embroiled with the belief claims, thus ego protection requires that the current belief system be held intact in an effort to maintain the sense of stability and meaning that the identity achieves from a uniform experience of reality.

The third point is that identity emerges out of the belief system structure. In the case of high complexity/flexibility, identity is detached from the individual belief claims, thus resulting in an identity that is defused across the belief claim configurations. In the case of low complexity/flexibility, identity is attached to the individual belief claims, thus identity is entangled with the belief claim configurations. The two manifestations of identity then exert reciprocating force back on the belief system. A detached identity should be related to high complexity/flexibility, and result in an integrated self concept and a maintenance path of truth preservation, while an attached identity should be related to low complexity/flexibility resulting in a compartmentalized self concept and a belief defensiveness path.

In this thesis, and generally in the relevant literature as well, identity, self, and ego are all used to refer to the sense of self that emerges out of the belief system structure. The structuring of the sense of self is subject to the same principals as belief system structuring.

CHAPTER TWO

BELIEF SYSTEM

The Belief System Structure

Both semantic network and cognitive mapping theories represent the belief system's structure as a set of intricately connected propositions (Johnson-Laird, Herrmann, and Chaffin 1984; Young, 1996). These theories provide insight into how the mind organizes a profound complex of concepts and information. Although there is controversy in the literature regarding the exact nature of semantic networks, there are common features that are fairly well established and accepted (Hartley and Branden 1997). Among these features is the notion that semantic networks represent knowledge through relationships between symbolic concepts (Young, 1996).

Belief Claims

The fundamental unit of the belief system is the belief claim. Belief claims are individual propositions or single manifestations of belief. i.e. "John Doe is a good man" - "photosynthesis is a biological process preformed by plants" - "all dogs go to heaven". Belief claims, as

individually asserted propositions, are like building units. Individual belief claims can be combined into complex sub-systems of still larger belief claims. This is similar to Carey's (2000) notion of concept structuring, in which concepts connect together to build complex representations expressing subject-predicate relations, "e.g. all animals die" (p 14). Belief claims collect into a system that provides structure to the individual's experiences, finally resulting in a personally meaningful belief system.

Complexity and Flexibility

There is the need to retain stability within and across the belief system. There are two important features that facilitate this process: complexity and flexibility. Complexity facilitates a dissection or distillation of the various belief claims within the system; "who is John Doe?", "what is good?", "is good universal?" "does good have divine origins?" "is good a man made construct?" "what is a man?" "is a man biology?", "is a man culture?", "what is culture?" "what is divine?" etc. The layers of complexity are infinite. However, if complexity becomes cumbersome and unwieldy, stability and continuity within

the belief system may be challenged. Flexibility facilitates contextual shifts of belief claim configurations. Flexibility exacts an equalizing effect in response to increasing complexity. Greater complexity of the belief claim configurations described above, gives rise to greater flexibility, which in turn makes further complexity possible; thus they are synergistically related.

Support for the complexity/flexibility concept can be found in epistemological belief research. Epistemological belief theory has a central bearing on the belief system proposed in this research. There should be meaningful correlations between the levels of complexity and flexibility and the features defined in the various stages of epistemological belief theory. Beginning with Perry's (1970) work with Harvard and Radcliff students, epistemological belief research has gained increased attention.

The basic template of this earlier research has been recast by many other researchers. For instance, it has been combined with research in need for cognition, need for closure, need for structure, dual processing theory, terror management theory (Landau, Johns, Greenberg, Pyszcynski, Martens,Goldenberg, and Solomon, 2004; Klaczynski 2000;

Klaczynski, and Fauth, 1997: Klaczynski, and Robinson, 2000), dogmatism (Klaczynski and Lavallee, 2005) and identity formation (Berzonsky 2008; Boyes and Chandler, 1992; Krettenauer, 2005). All of these researchers restyled Perry's original work using alternative terms, and various divisions or numbering of stages, in an attempt to better capture the specifics of their research. However, the various terms and number of stages has resulted in a lack of uniformity potentially hampering research intentions within the field (Greene, Azevedo, Torney-Purta, 2008). In addition, a bifurcation has emerged; starting with Schommer (1990), various multidimensional systems of belief have been developed as well (Hofer 2002).

Perry (1970) identified nine stages (what he termed positions); however, they can be grouped into four stages; 1) dualism, 2) multiplicity, 3) relativism, and 4) commitment (West 2004). Other researchers such as King and Kitchner (2004) have seven stages, while Kuhn's (1991) model divides into three stages; 1) absolutist, 2) multiplist, and 3) evaluative, see table one.

Table 1
Epistemological Stages based on Kuhn/Perry

Stage	1	2	3	4
Name	Absolute Dualism	Multiplicity	Evaluative relativism	Commitment
description	Dualistic structure, us/them right/wrong good/bad. Belief unexamined and taken for granted. All questions have an absolute right answer, authority can provide the answer. Complete certainty in belief.	Authority gives way to personal experience. Certainty in objectivity gives way to Certainty in subjectivity. All questions may not have an absolute right answer. There is still high certainty in ones beliefs, framed as personal opinion	Subjective objective balance is achieved. Personal experience is blended with expert view. Competing authorities are seen as a process where understanding is expanded. Certainty is tentative, belief is actively reorganized.	Restructure identity and beliefs. Recognize relative uncertainty of multiple possibilities. Detaches identity from individual beliefs. Dogmatic certainty is replaced with existential acceptance. Commitment to values and beliefs remade in terms of personal growth.

Perry (1970) notes that, in fact, the sequence of stages could be divided into as few as two positions, with the pivotal stage being position five.

This position marks a significant turning point in the progression. Positions one through four have retained in some fashion or other the idea of dualism. Position five is the jumping off point where dualism and relativism are transposed. The perception that all knowledge is contextual and relativistic is established. In this stage, the old way of thinking about knowledge has become cumbersome and unwieldy; dualism and multiplicity are at odds. To maintain a dualism at this point (i.e., answers are considered to be either right or wrong) requires a complicated cognitive structuring that eventually undermines the dualistic positions. For the student that perseveres, the weight of this dilemma gives way to the parsimony and elegance of relativism.

Perry (1970) refers to the shift to position five as "both the most violent accommodation of structure in the entire development, and at the same time the most quiet. It involves a complete transposition between part and whole; figure and ground" (p123). This revolution of thought is accompanied by a revolution in identity. In many cases the need for certainty in the "old self" led the student to gravitate toward the hard sciences as they seemed a last refuge against the relativism of the liberal arts

education. The new relativistic epistemology brings a kind of liberation in the ability to detach from belief. The discovery of genuine objectivity provides for a new competence in comprehending a plurality of context and conditions (Perry 1970).

In regards to the stage process, the first stage (dualist/absolutist) is characteristic of a kind of epistemological innocence. The individual holding this position sees knowledge as a "right and wrong" "black and white" "us and them" phenomenon that is encompassed in discrete facts (Kuhn 1991; Perry 1970). A simple (low complexity) certain (low flexibility) belief system would be manifest at this stage.

Individuals entrenched in dualism/absolutism are often angry and combative; they need an enemy to fight. There is often reactive rebellion toward certain (unsanctioned) authorities (academic, intellectual, political) that are seen as capricious and arbitrary; there is a retreat to the dogmatic "black and white" "either or" "us and them" orthodoxy; there is absolute certainty in the beliefs they hold, and unquestioned loyalty to the right authorities (Kuhn 1991; Perry 1970).

By contrast, for individuals at the last stages (relativism, commitment/evaluative) there is a transcendence. There is an active desire to continuously redefine, transfigure and cultivate ones life, investments, energies, and identity; in short, the belief system is regularly restructured. There is an affirmation by the individual that in a relativistic world, truths, relationships, purposes, and activities are embroiled in an ever changing context. There is acceptance of the limits of human reason. Thus commitment requires courage to take responsibility for ones identity and beliefs. A stabilizing maturity is juxtaposed against the realization of the fluidity of life. There is congruence between actions and contemplation. A general meaning is achieved, while at the same time there is comprehension that identity and beliefs will be forever recast (Kuhn 1991; Perry 1970). Individuals that are at these later stages should show high complexity and flexibility.

It is in the middle positions that the important transitions take place. In the middle positions (multiplicity) a skepticism or doubt about the ability to have certainty emerges. These confrontations with ambiguity begin first in areas or domains of personal taste, then

proceed to social issues; usually ill-structured problems, and finally to the interpretation of "hard facts" (Greene et al 2008; Perry 1970). The position of multiplicity will resolve the uncertainty in a form of subjective personal opinion (Kuhn 1991; Perry 1970; Greene et al 2008). Individuals holding such positions before the transposition described by Perry (1970) seem to use this as a fall back or face-saving method to hold generally to a dualistic frame. There is a continued attachment between identity and belief, "objective fact" has been replaced by a "subjective conviction", but high certainty in one's belief continues. However, after the transposition, multiplicity is resolved with an objective/subjective evaluative balance, identity is detached from belief, and ambiguity and uncertainty are tolerated as part of the process (Greene et al 2008). The transposition or ontological shift (Greene at al 2008) is like a shift in polarity, where until the shift the individual holds a general dualistic position. After enough domains have fallen to multiplicity, the polarities reverse, and the individual holds a general evaluative position. Complexity and flexibility then are the dynamic features by which the polarity oscillation and the reversal take place.

As has already been mentioned, beginning with Schommer (1990), the emergence of multidimensional models marks a departure from the developmental models following the Perry template (Greene et al 2008; Hofer and Pintrich 1997; Hofer and Pentrich 2002).These models were conceived as an alternative to the view that epistemological belief developed along a unidimensional line. From the multidimensional perspective it is understood that "personal epistemology is a belief system that is composed of several more or less independent dimensions" (Schommer 1990, p. 498) of belief.

The Schommer (1990) model is unique in that it is one of the first paper and pencil questionnaire methods of epistemological belief investigation (Hofer 2002). It has been reproduced with variations in wording, domain, and subject criteria (Jehng, Johnson, and Anderson, 1993; Schommer-Aikins, and Hutter, 2002; Schraw, Bendixien, and Dunkle, 2002; Wood and Kardash, 2002). Factor analysis generally shows factor loadings of four to five dimensions. They are a) structure of knowledge or simple knowledge b) certainty of knowledge or certain knowledge c) source of knowledge d) fixed ability in learning e) speed of learning; however, other investigations have indicated

consistency problems with the factor loading of these models (DeBacker, Crowson, Beesley, Thoma, and Hestevold 2008). When comparing several of these models, DeBacker et al (2008) state that the model showing the best consistency was generated by the Epistemological Belief Survey (EBS) (Wood and Kardash 2002).

Several researchers have questioned whether the five dimensions can truly be categorized as epistemological in nature (DeBacker et al 2008; Greene et al 2008; Hofer 2002; Hofer and Pintrich 1997). It has been asserted that speed and ability are better categorized as having to do with the nature of learning. The source of knowledge factor is more difficult to place, but seems related to authority (DeBacker et al 2008; Greene et al 2008; Hofer and Pintrich 1997). Simple knowledge and certain knowledge are more often referred to as the nature of knowledge.

The two nature of knowledge factors have the most relevance to the current thesis. In the EBS, Wood and Kardash (2002) refer to simple knowledge as the structure of knowledge; they state

> Low scores on this factor represent a view that knowledge is composed of discrete, unambiguous pieces of information, while high scores represent the view

that knowledge is often complex, interrelated, and ambiguous, with the implication that sometimes there is no 'one right answer'. (p.250)

It is asserted in this thesis that the simple knowledge dimension of the EBS is related to complexity. Low complexity should be represented by low scores on the structure of knowledge (simple knowledge) dimension of the EBS. Regarding knowledge construction and modification, *certain knowledge* Wood and Kardash (2002) state

> High scores on this factor reflect the idea that knowledge is constantly evolving, is actively and personally constructed, and should be subjected to questioning. By contrast, low scores on this factor reflect a view that knowledge is certain, passively received, and accepted at face value. (p. 250)

The knowledge construction and modification, *certain knowledge* dimension of the EBS should be related to flexibility. Low scores on this dimension should represent low flexibility; while high scores should represent high flexibility.

Depth and Breadth

Kuhn (1991) states that the notion of "thinking as argument" can explain how people hold beliefs, form judgments, reach conclusions, and make decisions based on a kind of internal, elaborative process involving the assertion of claims and then a justification process involving the casting of doubt on those claims - as in argumentative dialogues. The current thesis asserts that this elaborative process follows two paths, one of breadth, and the other of depth. Depth and breadth could be thought of as a field or grid that the belief system is predicated within. Within the depth and breadth field, an inquiry or a sort of self-applied Socratic Method is employed, where a person internally poses and responds to questions or propositions regarding various belief claims. As has already been stated, Kuhn (1991)refers to this phenomena, along with other aspects of thinking, as an internal argument. The depth and breadth probe inquiry is enjoined to verify and justify the validity and accuracy of the belief claims, and ultimately the belief system; the composition of the depth and breadth field will correlate with the degree of complexity and flexibility in the

system. With breadth alone there is an attempt to lower complexity.

Breadth could be thought of as a horizontal plane. An individual could follow a linear direction outward and across in an effort to justify various belief claims. By contrast, depth increases complexity; depth is more like a laminating effect. Depth is a re-examination of the belief claim in context. It is expressed through an increasing purview of sophistication regarding the scope, scale, and detail of the leading belief claim, thus elucidating and magnifying the defining detail of the belief claim in relation to other claims and the belief system. Depth necessitates a refinement of the original or leading belief claim. It is a clarification. In other words, to elucidate one of the belief claims in question, it is necessary to highlight and define the underlying belief claims that support it.

Kuhn (1991) found that a great deal of her subjects were unable to proceed past the stage of formulating and applying a causal theory to the stage of systematically evaluating the theory in the light of evidence. They rarely conceptualized evidence independently of their theory and failed to consider alternative theories, counter arguments

or rebuttals. This indicates that many people hold beliefs regarding reality/truth (metaphysical) with poor justification (epistemology). In support of these findings, both Davies (1998) looking at dogmatism, and Kemmelmeier (2010) looking at authoritarianism, found subjects high in these constructs had difficulty generating genuine evidence, alternative causes, counter arguments and rebuttals.

In the relation between evidence and belief in lay reasoning, a reliance on breadth alone would follow what Kuhn (1991) refers to as pseudo-evidence and/or non-evidence. In the case of pseudo-evidence, the subject provides a script, either hypothetical or from personal experience, that resembles the causal theory they are asserting. Personal experience it turns out is especially compelling. In the case of non-evidence, the subject often seems mystified that an explanation is required, or simply restates the phenomena; the implication being that the existence of the phenomena is sufficient evidence for the proposed causal theory. An individual with breadth alone is unable to imagine alternative points of view. This in turn makes it difficult to imagine that the prevailing view could be wrong. Kuhn (1991) found that subjects of this

sort could often provide a great deal of support for their belief, but it took on a redundancy; there was a shallowness in simply reiterating earlier assertions in slightly different terms.

In the case of depth, Kuhn (1991) describes subjects who begin with genuine evidence as demonstrating greater sophistication and complexity. Examples of genuine evidence are, a) correlated change: antecedent and outcome co-occur, b) counterfactual reasoning: if some external causal factor is absent, the outcome fails to occur, and c) analogy: mapping the asserted cause from one domain to another. The presence of genuine evidence (an element of complexity resulting from depth in the belief system) made it more likely that subjects would be able to provide alternative theories, counterarguments, and rebuttals. In short, the ability to provide genuine evidence indicated the subject's ability to falsify their causal theory. Kuhn (1991) states, that this further implies an ability to imagine that they could be wrong, which in turn indicates flexibility. The belief system is multi-dimensionally constructed of belief claim configurations in a field of depth and breadth. The property of breadth alone demonstrates an inadequate justification process resulting from a simple (low

complexity) rigid (low flexibility) belief system structure that requires little cognitive effort when integrating belief congruent data but has difficulty adjusting to incongruent data. Because of this, it is prone to sacrifice truth preservation for belief defensiveness. The capacity to elaborate belief claims in terms of both depth and breadth requires high complexity and flexibility and a belief system structure that expends similar amounts of cognitive resources when adjusting to both belief congruent and belief incongruent data. Thus the justification process is more sophisticated. A belief system with both depth and breadth will also likely prove more efficacious in generating an accurate view of reality. Thus truth preservation too is much more likely. This distinction between breadth and depth, and high/low complexity/flexibility in the verification/justification process of belief claim configurations plays an important role in the belief system function. As was stated at the beginning of this paper, the purpose of the belief system is to maintain stability and continuity in ones experience. These maintenance functions should have parallels to dual processing theory, need for cognition and dogmatism. Also there is the role of identity. Identity too plays an

important and intricate role in belief system function and the maintenance process.

CHAPTER THREE

BELIEF SYSTEM MAINTENANCE: TRUTH PRESERVATION VERSES BELIEF DEFENSIVENESS

Truth Preservation

Kuhn (1991) describes more efficacious causal theory/belief system structuring as following a systematic process of genuine evidence production, followed by the generation of alternative theory counterargument and rebuttal, all indicating an ability to imagine one's current position to be wrong *flexibility*. Stanovich and West (1997) add that some individuals have an ability to adjust their beliefs to evidence through a process of decontexualization; separating reasoning from belief *complexity*. To return to the breadth and depth metaphor, a capacity or proclivity to emphasize depth over breadth (high complexity) would support truth preservation over belief defensiveness. Similarly, need for cognition, a disposition to engage in analytical thinking, a willingness to tolerate uncertainty, (Cacioppo and Petty 1982) and cognitive flexibility should favor truth preservation over belief defensiveness.

Kuhn, Cheney, and Weinstock (2000) discussing epistemological development describe what they call a *radical shift* from an absolutist position, where objectivism is dominant, to a radical subjectivism and relativism, where opinion and personal experience dominate, and finally, to an evaluative position where a coordinated balance is achieved between objectivity and subjectivity.

Need for cognition research (Cacioppo and Petty 1982; Yun Dai and Wang, 2007) sheds additional light on the cognitive undertones of motivation to revise or restructure beliefs in an effort to preserve truth. Cacioppo and Petty (1982) state that individuals who score high on the Need For Cognition scale (NFC) have a tendency to enjoy effortful thinking, that they have a high need to "understand and make reasonable" (P. 117) experiences in the world, and that thinking is often seen as a "quest for reality".(P. 117)

For belief revision in the interest of truth preservation to take place, cognitive effort must be expended. Additionally, the belief system's structure regularly needs reorganization, as accurate understanding of experience is an on-going process. Also required is an ability to separate individual belief claims from the

belief system at large and subject the claim to critical doubt (Schauble, 1996). Consequently, truth preservation is best served by belief system structures that facilitate more rational and analytical cognition - forms of thinking that can override or counter tendencies toward belief defensiveness. Such dispositions, as suggested by the research reviewed above, would include the need for cognition. High scores on the NFC scale should be related to tolerance of uncertainty, an awareness of the distinction between theory and evidence, and a personal epistemology that views knowledge as an evaluative objective/subjective balance. Ultimately, individuals high in NFC should favor truth preservation over belief defensiveness.

It has already been argued that truth preservation should be a function of both high complexity and flexibility within the belief system. It has also been indicated that the two nature of knowledge dimensions of the EBS - structure of knowledge simple knowledge and knowledge construction and modification certain knowledge should be related to complexity/flexibility, respectively. Further support should be found when including the NFC scale. It is expected that NFC should be related to both

the simple and certain knowledge dimensions, indicating that need for cognition is a result of high complexity and flexibility. Kardash and Scholes (1996) found when relating NFC to the Schommer (1990) version of certain knowledge, that there was a positive and unique contribution of NFC to the ability to contend with uncertainty. This seems to indicate an important relationship between these constructs. The current thesis asserts that NFC should have a stronger relationship with complexity then flexibility; this should be reflected in a stronger association between NFC and simple knowledge then between NFC and certain knowledge.

Belief Defensiveness

According to dual processing theory, we tend to use heuristic processing for evidence that is consistent with our beliefs, and critical analytical processing for evidence that is contrary to our beliefs. Data that are consistent with readily accepted prejudices and stereotypes are processed heuristically because they are theory-consistent. However, when individuals are confronted with theory-inconsistent evidence, (e.g. evidence that contradicts prejudices and stereotypes) analytic processing

is activated in an attempt to defend the beliefs against the inconsistencies (Klaczynski and Robinson 2000; Klaczynski and Narasimham 1998; Klaczynski and Fauth 1997). As Klaczynski and Robinson (2000) state, "[t]he person attempts to construct a convincing, logical refutation to protect the assaulted belief system and, in some cases, identity and self-esteem." [p. 401]. Klaczynski and Narasimiham (1998) describe two potential paths for defending beliefs - cognitive maintenance and ego protection.

In both cases the degree of complexity and flexibility are expected to be low. Intuitively, a belief system with low complexity/flexibility should be able to easily add belief congruent information, as it is a simple matter of assimilation, but should have difficulty with belief incongruent information, as the complexity and flexibility required for restructuring may be lacking. Epstein (1994) indicates that there is a potential for "collapse (disorganization) of the theory of reality/belief system following unassimilable emotionally significant experiences". This means that an over all theory of reality, i.e., the belief system, even when in error, would likely be defended when confronted with disorganization or

collapse. In this case, truth preservation will be sacrificed for belief defensiveness.

Cognitive Maintenance

People construct meaning through their beliefs in a variety of ways, for a variety of reasons. One function of the belief system is to simplify and manage information (Neuberg and Newsom, 1993). This is essentially a cognitive maintenance function. Individuals reduce complex and ambiguous information with heuristics, scripts, schemas and other cognitive methods (Landau, Johns, Greenberg, Pyszcynski, Martens, Goldenberg and Solomon, 2004) based in their belief systems. Klaczynski and Narasimham (1998) and Klaczynski and Robinson (2000) argue that many lay or personal theories, interconnected beliefs claims forming an explanatory system, originate as efforts to explain the world, reduce cognitive load, and create a sense of well being. It is asserted in this thesis that a belief system with high complexity/flexibility will show greater efficacy in truth preservation, while at the same time maintaining general stability, as opposed to a low complexity/flexibility belief system which will be forced to sacrifice greater truth preservation for stability.

The role of cognitive maintenance in the above stated dilemma for the low complexity/flexibility belief system is well supported by need for closure and need for structure research. Need for closure is defined as a persons desire to minimize ambiguity by means of forming definite answers to situations and questions (Kruglanski, Pierro, Mannetti and De Grada 2006; Kruglanski, Webster and Klem 1993; Mannetti, Pierro and Kruglanski 2007) Closure is acquired through a process of *seizing* and *freezing* on information that provides a conclusion; in other words, high need for closure individuals will seize upon such information in an attempt to end the ambiguity of uncertainty, and then hold tenaciously to their conclusions regardless of later presentations of additional information (Kruglanski et al 2006; Mannetti et al 2007; Golec and Van Bergh 2007). Closely related to the closure construct is research in need for structure (Neuberg and Newsom, 1993) indicating that there are two strategies that individuals adapt in an attempt to manage the vast amount of information that exists in a person's everyday world. One is avoidance. People avoid in a variety of ways - they build fences, stay in doors, and ignore. The other is structuring. Examples of this are simplifying, generalizing and stereotyping

(Neuberg and Newsom 1993). In both cases, this is done in an attempt to lower cognitive demand. Neuberg and Newsom (1993) claim that the need for structure aids in understanding the world, but that people who are high in need for structure tend to be more prone to simplifying stereotyping and prejudice.

Measures of dogmatism also show that various forms of cognitive rigidity are commonplace. Dogmatism can be defined as unchanging unjustified certainty, low flexibility. High scores on the dogmatism scale (DOG) predict clinging to untenable attitudes, even in the face of strong scientific and empirical evidence (Altemeyer 2002; Altemeyer 1996). Altemeyer (2002) showed that students high in dogmatism refused to acknowledge inconsistencies in the Bible, even when they were explicitly shown such inconsistencies. Finally, dogmatism shows a high correlation with authoritarianism (Altemeyer, 1996). Cornelis and Van Hiel (2006) state people's beliefs are in part thought to be related to underlying cognitive motivations that are partially determined by information processing styles such as need for closure and dogmatism.

Further support for a relationship between dogmatism and these cognitive mechanisms can be found in research by

Davies (1998; 2005). Davies (1998) found that individuals high in dogmatism were more prone to generate theory congruent reasons for a belief, and less able to generate theory incongruent reasons. As has been argued, one possibility for this is belief formation requires less cognitive resources than belief revision. This is similar to the need for closure research cited above (Kruglanski et al 2006), and to the dual process theory claim that evidence consistent with belief is processed heuristically, while evidence inconsistent with belief is processed analytically (Klaczynski and Robinson 2000; Klaczynski and Narasimham 1998; Klaczynski and Fauth 1997) The degrees of complexity and flexibility (high/low) will dictate whether the system will only be able to add new belief congruent information, or whether it will be able to adjust with equal effort i.e. cognitive load, to both belief congruent and belief incongruent information.

Ego Protection

Cognitive maintenance concerns of stability and cognitive economy are not the only explanation for a tendency to maintain poorly supported beliefs. As has already been expressed by Klaczynski and Robinson (2000), and Klaczynski and Narasimiham (1998), the role of the

belief system in the preservation of the self - the ego protective function - is also important

As noted above, identity is, for low complexity/flexibility systems, closely tied to the structure of the belief system. As a consequence, belief bias can result from a need to enhance self-esteem, maintain self image, and keep a positive view of the in-group's stature even at the expense of truth preservation. These are ego protective functions. From the standpoint of ego protection, belief defensiveness serves the purpose of maintaining stability within the identity. This is in line with Klaczynski and Narasimiham's (1998) findings, and is supported by CEST (Epstein 1994) terror management theory (Schimel, Greenberg, Pyszczynski, Solomon, Waxmonsky, and Arndt, 1999; Pyszczynski, Greenberg, and Solomon, 1999; Greenberg, Pyszczynski, Solomon, Rosenblatt, Veeder, Kirkland and Lyon, 1990) and amebic self theory (Burris and Rempel 2004).

Klaczynski and Narasimiham (1998), state that ego protection elevates self esteem and enhances self image. The self serving motivations of ego protection are likely to defend beliefs connected to any in-groups (Solomon, Greenberg, and Pyszczynski, 2000; Klaczynski 2000; Schimel

et al, 1999; Pyszczynski et al, 1999; Greenberg et al, 1990). Kaczynski and Gordon (1996) indicate that personal investment among adolescents and young adults can result in bias in the application of cognitive skills. Adolescent and young adult subjects found "goal-enhancing" evidence more convincing than "goal-threatening" evidence, even though the evidence was essentially equivalent. This, along with the dogmatism citations above are further examples of ego/identity-centered reasoning (Klaczynski and Robinson, 2000), where personal theory resilience (belief defensiveness) overrides truth preservation.

Because the DOG scale is an especially robust measure of exaggerated certainty in ones beliefs, it is expected that this measure should have a strong negative relationship to high scores on the nature of knowledge dimensions of the EBS, specifically certain knowledge.

CHAPTER FOUR

THE ROLE OF IDENTITY

Identity Emerges from the Belief System

The current thesis advances the notion that identity or the self emerges out of the belief system structure described above. Identity is expected to follow a similar structuring process. That is, the nature of belief claim configurations that form the belief system, should also apply to identity or the self. Identity should be subject to the same dimensions of complexity and flexibility, and thus should show similar attributes in the justification process. Finally, once identity has formed it should apply reciprocating pressure back on the belief system influencing the direction of further structuring and the maintenance process.

Cognitive Experiential Self Theory (CEST)

Epstein, (1994) states that individuals automatically and implicitly construct a model or theory of reality (belief system) that is divided into two major parts; a world theory, and a self theory. The two sub-theories, world and self, are both individually formed by connecting

propositions (belief claims) that also bridge the two sub-theories into the over all theory of reality. The theory of reality is maintained by two cognitive systems; rational and experiential. The rational system is deliberative and basically emotionally detached. The experiential system provides for quick intuitive assessment of situations that allow people to react without long effortful deliberations that could prove costly; however, the experiential system is also susceptible to irrational and superstitious thinking and is prone to emotional overreaction. Understanding acquired through the experiential system proves especially resistant to revision because it is most active during states of heightened emotional arousal.

Identity and Belief System Maintenance

Support for the notion that peoples' beliefs and identity are interconnected and play dual roles in an attempt to achieve and maintain consistency stability and meaning in their experience is supported by several other areas of research For instance, Amoebic Self Theory involves another view of the close connection between the belief system and self-definition or identity. At the spatial symbolic level, people have developed the cognitive

capacity for symbolic and abstract thinking which enables them to imbue objects, persons, locations, and situations with personal meaning. For example people have a tendency to regard things like childhood homes, relationships, and cultural history as extensions of the self. According to this view, individuals' identity is bound to these "identity markers"; there is an implicit and unquestioned endorsement of how the world is. These assumptions serve to orient and stabilize the self, reducing subjective uncertainty (Burris and Rempel 2004).

Terror Management Theory (Greenberg et al 1990) posits that people conceptualize reality in response to the knowledge of mortality. Terror management theory suggests that the identity or self is embedded within one's sense of reality or world view or belief system. This sense of reality is constructed in such a way as to protect or "buffer" the self. Terror management theory and global cultural world view state that humans create and share beliefs that provide individuals with the sense that their existence is meaningful and enduring in an attempt to buffer the self from anxiety produced from the awareness of ones mortality (Solomon et al 2000). Mortality saliency is raised when the subject thinks about their own death.

Usually this is accomplished by having the subject write a paragraph describing how they think they will die. Control subjects are instructed to write a comparable paragraph describing something unpleasant such as dental pain.

The anxiety buffer is accomplished in two ways; first, by providing a stable sense of reality, and second, through the creation of a "social identity" that accepts the validity of the provided reality, securing the self and elevating self esteem (Schimel et al, 1999; Pyszczynski et al, 1999; Greenberg et al 1990). When mortality saliency is raised, *threat to self*, terror management theory has demonstrated people's tendency to hold more closely to their world view beliefs in such distinct areas as morality, (Pyszczynski et al 1999), justice (Dalbert, Lipkus, Hedvig and Goch, 2001), nationality, race, ethnic and gender identity, (Schimel et al 1999) and religious belief (Beck 2006; Jungmen, Nesselroade and Featherman, 1996).

The above findings suggest a malleable bond between identity and beliefs. There is also evidence indicating individual differences in the character of this bond in terror management theory. Schimel et al, (1999) found that, when under mortality salience, individuals with high need

for closure scores showed greater preferences for negative out group stereotypes, such as gay males, then individuals with low need for closure scores. Similarly, individuals high in need for structure (Landau et al 1999) were found to dislike individuals who displayed inconsistent personality traits (sometimes introvert, sometimes extrovert). Landau et al (1999) also found high need for structure scores lead to greater "victim blaming" when under mortality salience. Other terror management theory research has shown that people high in authoritarianism are more likely to derogate dissimilar others when under mortality salience then are individuals low in authoritarianism (Greenberg et al 1990).

Finally, terror management theory research has found differences in the mortality salience effect when evaluated with both dual process theory (Pyszczynski et al 1999) and CEST (Simon, Greenberg, Harmon-Jones, Solomon, Pyszczynski, Arndt, Abend, (1997). It appears that the mortality salience effect is more pronounced when individuals are in an experiential/heuristic processing mode as opposed to rational/analytic, which seems to nullify the mortality effect.

The terror management research cited above makes clear that one's beliefs and one's identity are interwoven, and that identity plays an important role in maintaining stability and meaning in ones existence. The relevance to the present study is twofold. First, it clearly demonstrates both within and between subject differences of the bearing of identity on the belief system. When mortality saliency is high, identity binds to the belief resulting in a more rigid, low flexibility structure. When evaluated through CEST and dual process theory, experiential and heuristic processing modes also show this attachment of identity to belief. As has already discussed, when understanding, or belief formation is acquired through the experiential system it shows considerable resistance to revision (Epstein 1994). By contrast, the rational and analytic modes are less susceptible to the mortality saliency effect, indicating these processing modes have an effect of decontextualizing identity and belief. Finally, the individual difference measures, need for closure, need for structure, and authoritarianism, showed that individuals high on these traits were more predisposed to a general embroilment between identity and belief. Taken together, these points support the idea that identity and

beliefs play separate but related roles in maintaining the stability and continuity of the belief system. They also show that identity emerges from the belief system structure, and that the extent of complexity and flexibility will influence the degree of attachment of identity to the various belief claims, and that the degree of attachment will affect further levels of complexity and flexibility.

Identity and Epistemology

Kuhn (1991) points out that individuals who show difficulty generating evidence that is inconsistent with their own theories demonstrate a sort of "ownership" of the theory which contributes to their inability to falsify the theory, as in conceive of alternative theories and counter argument. This is in line with the notion that there is interdependence between lay theories and related belief claims on the one hand and the self and identity on the other. Perry (1970) claims that individuals at the first epistemological position, dualism, are unable to detach their identity or self-concept from their beliefs. They have no vantage point to imagine anything outside of their beliefs. An important feature regarding such individuals is

the absolute certainty with which they hold their beliefs. Subjects who score high on the DOG scale tend also to display high confidence in their judgments, even when evidence is scant or contradictory (Altemeyer 2002; Altemeyer1996; Cornelis and Van Hiel 2006; Davies 2005; Davies 1998).

Research combining epistemic belief and identity status (Boyes and Chandler 1992; Krettenaur 2005) provides another perspective on the involvement between belief system structure and identity formation. The identity status paradigm is marked by a tension between the two dimensions of exploration and commitment. Exploration indicates an "active questioning and weighting… of various identity alternatives", while commitment indicates the presence of conviction and choice regarding a particular identity conception (Luyckx, Goossens, Soenens, Beyers, Vansteenkiste, 2005, p. 605). There are four identity statuses; Achieved, which is formed after a meaningful exploration and solid commitment, Foreclosed, which results from a strong commitment but is lacking exploration, Moratorium, distinguished by prolonged exploration, but no meaningful commitment, and Diffused, which is characterized

as having neither exploration nor commitment (Luyckx, et al 2005)

Boyes and Chandler (1992) showed generally that the lower epistemic positions, realist/dualist/absolutes, were associated with the lower identity statuses, foreclosed and defused, while the higher epistemic positions, relativism/evaluativism were associated with the identity statuses of moratorium and achievement. The pertinence of the Boyes and Chandler (1992) study is the importance of the advent of "epistemic doubt". They contend that it is the ability to struggle with uncertainty, arising during the transition between the cognitive developmental stages of concrete operational and formal operational thinking that facilitates the epistemic shifts that in turn result in the different identity statuses.

Krettenauer (2005) found similar results when he included identity processing styles. There are three identity processing styles. Information processing, considered the most advanced, is defined by actively seeking, utilizing, and processing self relevant information. When confronted with discordant and conflicting feedback, individuals with an information processing style are willing to test and revise aspects of

their self-theory. The second style is Normative. These individuals resist belief and value- threatening identity questions and information, and instead resolve such dilemmas by conforming to expectations of significant authorities. Finally, there is the Diffuse/Avoidant processing style. With this style there is a reluctance to deal with identity relevant questions at all. Instead, there is a focus on temporary states of self-definition, such as popularity, as in social self. These ad-hoc adjustments to self-definition as apposed to stable changes in the identity structure are associated with maladaptive emotionally focused avoidant coping (Berzonsky 2008; Krettenauer 2005).

It appears that the more sophisticated information processing styles, information orientation, and the later epistemic position, evaluative, both seem to contribute simi-independently to an achieved identity status, while the diffuse/avoidant style and absolutist position predicted identity diffusion and foreclosure. Interestingly, it was the foreclosed identity status that predicted normative processing. This reverse pathway is thought to indicate that a foreclosed identity influences processing style, as apposed to cognitive style influencing

the identity statuses, as was the case with diffuse/avoidant and information orientation (Krettanauer 2005). Berzonsky (2008) found similar results when comparing identity processing styles to CEST. These results showed that the information processing style had a stronger relationship to the rational mode then to the experiential mode. In addition, the normative style correlated positively with experiential cognition. Finally diffuse/avoidant was positively correlated with experiential cognition, and negatively correlated with rational cognition.

From the above findings, it could be surmised that a belief system with low complexity/flexibility is likely to result in a diffused or foreclosed identity status, while an achieved identity is more likely to result from a high complexity/flexibility belief system. The above lends credence to the idea that a belief system that manifests higher degrees of complexity and flexibility will also manifest greater complexity and flexibility in the self/identity; these findings combined with the terror management citations above, also suggest that the less sophisticated cognitive styles result in a compounding between identity and belief.

Self Structure and Belief System Structure

To this point, it has been argued that identity arises out of the belief system structure, and that once identity has formed it exerts reciprocating influence back on the belief system. As was indicated by CEST, there are two sub-systems, one regarding beliefs about the self, and the other regarding beliefs about the world the self is embedded within. Also it has been supported that these two sub-systems are interwoven. One of the claims of the current thesis is that the degree of embroilment between the two sub-systems is predictive of the level of complexity and flexibility in the belief system at large. Specifically this is the question of degree of identity attachment to the various belief claims. As has already been addressed in the discussion of epistemological beliefs, a simple, rigid belief system makes little distinction between the belief and the self (Kuhn 1991; Perry 1970) Studying self-structures provides an opportunity to assess this particular claim of this thesis. Specifically, the degree of entanglement of the self-structure with the belief claim configurations should be a function, in part, of the relative status of the individual's belief system in terms of the two dimensions

of complexity and flexibility. The identity status literature discussed above supports the idea that greater sophistication of both cognitive processing and epistemological belief are related to a more sophisticated identity that is relatively independent of the belief system. According to Margolin and Niedenthal (2000), the self-concept is a network of information consisting of categories, schemas, and prototypes. Linville (1987) adds that self knowledge is represented in multiple self-aspects. Self-aspects are in turn formed or constructed from sets of features and propositions; these self-aspect structures form into associative networks that allow different self-aspects to be activated under different conditions and contexts. Markus and Kunda (1986) introduce a feature they call a "working self-concept". The working self is a momentary combination of a few self-aspects that are activated in unison by experience and social situations; that is, the working self is a temporary collection of elements pulled from a universe of self-aspects that make up the over all self concept (Markus and Kunda, 1986; Margolin and Niedenthal, 2000).

Linville (1987) maintains that self-concept complexity is manifest, in part, in terms of the number of self-

aspects; greater numbers of distinct self-aspects result in greater complexity of the self concept. A self-concept with greater complexity, as defined above, is thought to cope with stress better (Margolin and Niedenthal 2000; Linville 1987; Markus and Kunda 1986). Although the specific reasoning for this varies among the researchers cited, one consistency seems to be that greater self-complexity results in greater stability. In the case of both Margolin and Niedenthal (2000), and Linville (1987), the assertion is that the larger number of self-aspects, and the greater diversity between self-aspects serves as a buffer stabilizing the self-concept by preventing effective extremity (the degree of affective swing in response to an event) from spreading, or "spilling-over" to other self aspects.

A metaphor for the system of diffusion of stress across multiple self aspects is that of a baffle system in a tanker transport. One large single compartment does not deal effectively with sudden or extreme changes, as the liquid inside will slosh around creating instability. However, a baffle system creates multiple semi-independent cells that diffuse the energy of moving liquid.

When considering the complexity/flexibility dimensions, it is probable that the large number of self aspects described above facilitates multiple connection points between multiple self-aspects across multiple belief claims. This would be supportive of the complexity dimension. When considering the working self concept, Markus and Kunda (1986) indicate this is a dynamic and malleable property, implying flexibility. When these points are taken together, the concept of identity/belief detachment becomes more comprehensive. A self concept with multiple points of belief attachment is able to let go of certain belief claims under certain contexts, while others are preserved or activated, thus maintaining a general sense of self/identity across the belief system. By contrast, a self concept with few self-aspects and little distinction between self-aspects provides less diversity for a working self to operate within. In this later case, such a self concept should be more prone to stronger identity/belief attachment. Like a tanker with a single cell, there will be a strong desire to resist sharp or distinct changes in the belief system, as this would threaten the stability of the self.

A second metaphor will help further illustrate this idea; the belief system could be thought of as a rope and knot system, where the knots serve as the connection points between identity and belief claims. There are two types of knot systems possible. In one case there are multiple semi-independent knots forming a knot lattice. In the second knot system the knots are knotted together in a haphazard tangle, essentially forming a single knot. When considering belief system maintenance, it is likely that the different self structures described above would follow different maintenance paths (truth preservation/belief defensiveness). Under the knot tangle conditions, adding knots (belief congruent data) can be done easily and heuristically, as was discussed in the belief system maintenance section. However, subtraction of knots risks an untangling of the entire system, thus the disorganization and collapse of the belief system referred to by Epstein (1994). In this case there are fewer self-aspects for the diffusion process described above, and the self identity is more firmly bound or attached to the belief system at large. On the other hand, the lattice system, because the knots can be dealt with independently, results in roughly

the same cognitive effort to adjust to belief congruent (add knots) as to belief incongruent (subtract knots) data.

According to McMahan, Showers, Rieder, Abramson and Hogan (2003), Showers and Kevlyn, (1999), Showers and Zeigler-Hill (2007), and Zeigler-Hill and Showers (2007), self structure is a self organization that focuses on a distribution of negative and positive self beliefs across multiple self-aspects.; There are two extremes to the self structure - one is compartmentalization, the other is integration (Showers and Zeigler-Hill 2007). An integrated self structure has a more or less even distribution of negative and positive self beliefs in the various self-aspects, while a compartmentalized self structure has either all negative or all positive self beliefs within a given self-aspect. Greater complexity in this model would involve a primarily integrated structure while lower complexity would involve a compartmentalized structure. It has been shown in a variety of studies that the integrated self structure displays greater stability, especially under stress, while the compartmentalized self structure appears to have inflated self-esteem, and high confidence (similar to high dogmatism and need for closure), but becomes disorganized when under stress (McMahan et al 1999; Showers

and Zeigler-Hill 2007; Zeigler-Hill and Showers 2007). Showers Abramson and Hogan (1998) state that an integrative organization requires more cognitive effort, where as compartmentalization is a less taxing cognitive strategy. This is similar to the dual processing notion discussed above, indicating that an integrative system is organized analytically, and the compartmentalized system is organized heuristically.

The nature of the compartmentalized structure leads to limited accessibility of negative information processing (Showers 1992), similar to the belief defensiveness described above. Because of this, a compartmentalized structure has a greater fluctuation (affective extremity) with daily events (Zeigler-Hill and Showers 2007). Unstable self-concepts lack clarity, and have a tendency to include inconsistent attributes and may resist change, especially to negative events (Showers et al 1998), again indicating a belief defensiveness path. This is essentially the single knot tangle or tanker compartment that resists adjustment, and favors defense. This thesis contends that there should be a relationship between an individual's self structure, as assessed by the number of self-aspects, the divergence between self aspects (Linville 1987), and their degree of

integration (Showers 1992), and the degree of complexity/flexibility of the belief system at large. A multi-aspect divergent and integrated self structure should be associated with a complex and flexible belief system supporting a detached identity, while a self with few aspects, low divergence, and a compartmentalized structure should correspond to low belief system complexity/flexibility and to identity attachment. The method for examining the number of self aspects, the degree of divergence between self aspects, and compartmentalized verses integrated self structure is a card sorting task (Linville, 1987: Showers, 1992) where participants are asked to think of different self-aspects and form categories from cards with descriptive attributes printed on them. It is believed that the Showers (1992) and Linville (1987) card sort task is the best available method for assessing the degree of identity attachment. It is expected that individuals with an integrated self featuring multiple aspects with high divergence will score high on measures of complexity and flexibility - namely, the two nature of knowledge dimensions (simple/certain) of the EBS and the NFC - and will score low on a measure of inflexibility or rigidity - the DOG scale. This will be

considered support for the hypothesis that a belief system with high complexity/flexibility contains an identity that is generally detached from the belief claim configurations, where as a low complexity/flexibility belief system will contain an identity that is attached to the belief claim configurations.

CHAPTER FIVE

REVIEW AND HYPOTHESIS

Summary Review

At the beginning of this paper it was argued that the belief system is a network of propositions, or belief claims, that can be organized in either a complex and flexible structure, or a simple, *low complexity*, and rigid *low flexibility*, structure. Epstein (1994) provided support for this same principle resulting in both a world theory and a self theory. With Kuhn (1991) Perry (1970) and Greene et al (2008), the belief justification process was introduced. Poor justification seemed to be a result of strong personal attachment to the belief claim. The terror management research also showed that the degree of identity attachment can indicate the degree of complexity and flexibility.

It has been argued that belief system structure results from the cognitive structuring of unit parts, belief claims,that are propositional in form. The belief claims connect into configurations that ultimately provide the individual with a sense of meaning and stability. The

belief claim configurations are predicated within a field of depth and breadth, and are maintained by the dual dimensions of complexity and flexibility. The sophistication of belief justification is an indication of the degrees of complexity and flexibility (high/low) manifest in the system.

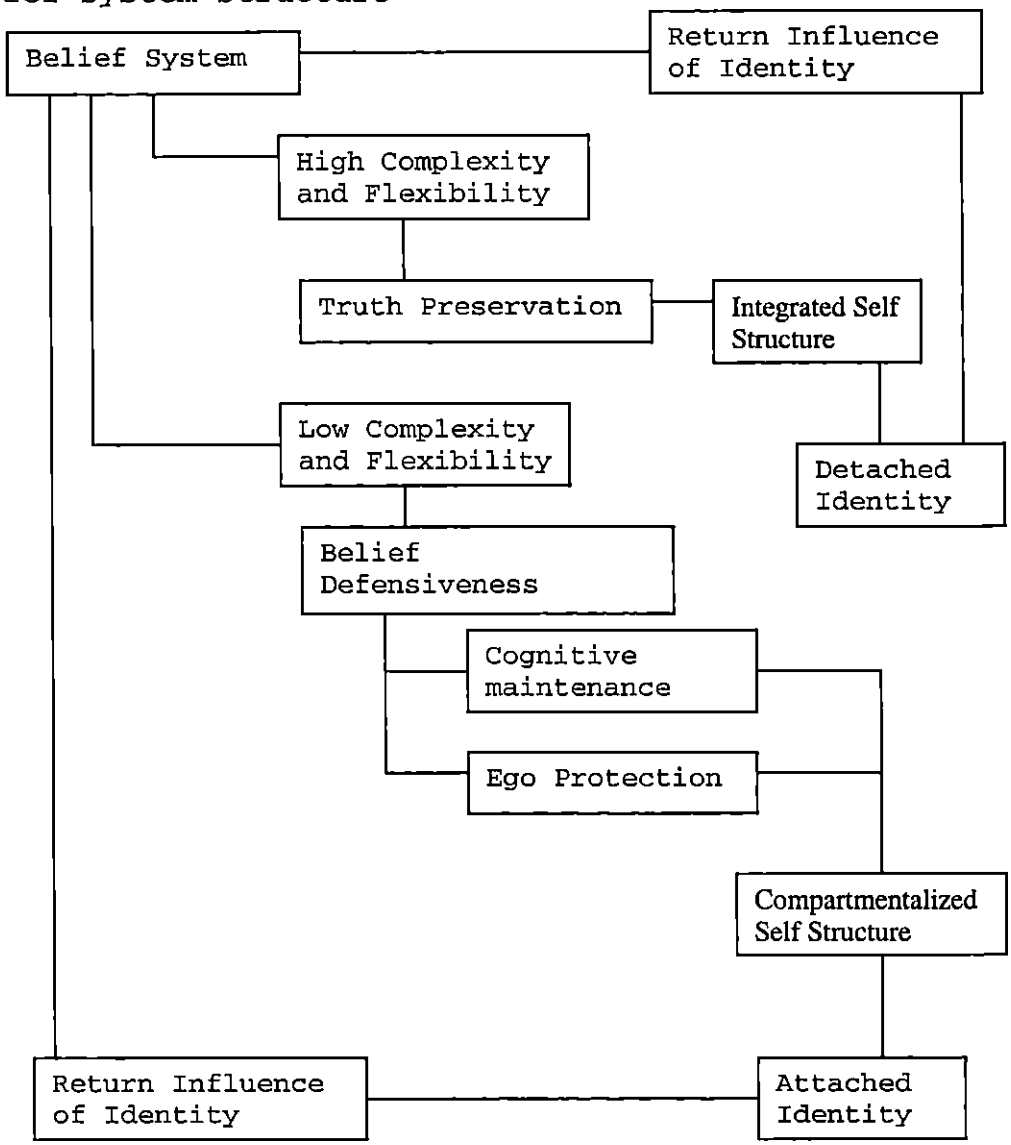
The achievement of meaning and stability follows two general paths: truth preservation and belief defensiveness. A belief system with high complexity and flexibility will generally follow the truth preservation path, as adjustment to both congruent and incongruent data is possible. A belief system with low complexity and flexibility will follow a belief defensiveness path, as belief incongruent data is difficult to integrate. Also, belief defensiveness divides again into cognitive maintenance and ego protection. Cognitive maintenance is an attempt to refute belief incongruent data, lower cognitive load, and maintain the current structure. Ego protection is an attempt to protect the sense of identity that is attached to the belief claim configurations.

Finally, it was argued that identity emerges out of the belief system structuring. Once identity has formed, it exerts pressure back on the belief system. There is a

direct relationship between the extent to which an individual's identity is attached to the belief system and the degree of complexity/flexibility of the belief system. An identity that is strongly attached to the belief claim configurations, as evident in a compartmentalized self structure, will be associated with a belief system featuring low complexity and flexibility. By contrast, an identity that is loosely attached (detached) from the belief claim configurations, as indicated by an integrated self structure, will show high complexity and flexibility. See figure one.

Figure 1

Belief System Structure



Hypotheses One

The structure of knowledge or simple knowledge scale of the EBS (from here forward to be referred to as EBScomp) is thought to represent complexity, while the knowledge

construction and modification or certain knowledge scale of the EBS (from here forward to be referred to as EBSflex) is thought to represent flexibility. NFC is known to be related to complex cognitive processing, while DOG is a measure of inflexibility. Thus these four measures will be used to assess the general complexity and flexibility of the belief system. The first hypothesis below exclusively concerns these measures.

The card sorting task measures complexity and flexibility regarding self structure and the degree of attachment of the self or identity to the belief system. A card sort resulting in few self aspects, low divergence between self aspects (Linville 1987), and a compartmentalized self structure (Showers 1992), indicates a simplified inflexible set of self beliefs, and is thought to indicate strong belief claim attachment. By contrast, a sort characterized by numerous self aspects, greater divergence between self aspects (Linville 1987), and a relatively integrated self structure (Showers 1992) indicates greater complexity and flexibility, and weak belief claim attachment. The sorting task is central to the second hypothesis of the study.

The DOG scale should have a significant, negative relationship with the two nature of knowledge dimensions, EBScomp and EBSflex of the EBS and with the NFC scale. All correlations among the latter three measures should be significant and positive. Second, it is expected that the NFC scale will have a stronger association with simple knowledge than with certain knowledge or the DOG scale. Finally, the DOG scale will have a stronger relationship with certain knowledge than with simple knowledge or the NFC scale. These predictions stem from the claim that EBScomp and the NFC scale are measures of complexity and EBSflex and the DOG scale are measures of flexibility.

Hypothesis Two

The second and primary hypothesis of the study is a claim that degree of complexity and flexibility in the overall belief system will be related to complexity/flexibility of the self structure and to the extent to which the individual's identity is separated from the belief system. Specifically, it is expected that the NFC and both EBS scales will be positively associated with larger numbers of self aspects, greater divergence between self aspects, and greater integration of self-aspects on

the sort task, while the DOG will be positively associated with low numbers of self aspects, low divergence between self aspects, and greater compartmentalization.

CHAPTER SIX

METHOD

Participants

Participants consisted of 94 college undergraduate students taking psychology and human development classes at the San Bernardino campus of the CSU. The sample included 7 males and 47 females (41 participants failed to indicate their gender). Participants' age ranged from 18 to 52 years with a mean age of 25 years (SD = 8.0). Family income ranged from less than 16K to 90K with a median income of between 50K and 60K. Many participants were first-generation college students. Only 53% of participants' mothers, and 49% of participants' fathers, had attended college classes. Participants' GPA ranged from 2.0 to 4.0 with a mean of 3.1, and a standard deviation of .41. The sample was ethnically diverse and included 22% Caucasian, 44% Hispanic, and 17% African American. Most participants (77%) had never been married. Approximately 70% of the sample described themselves as following traditional or established religious beliefs.

General Procedure

All participants were given three self-report, questionnaire-type measures and a sorting task. The measures were presented as a block and the order of presentation for the measures were randomized within and across participants. Half of the participants were given the block of measures followed by the sorting task while the other half were given the sorting task followed by the block of measures. All testing took place in the cognitive lab in the SB building.

Measures

Participants completed three self-report, questionnaire-style measures: A modified version of the Epistemological Belief Survey (EBS) (Wood and Kardash 2002), the NFC (NFC) scale (Cacioppo and Petty 1982) and the Dogmatism scale (DOG) (Altemeyer 2002). For each of these measures, participants were asked to indicate their degree of agreement with individual statements using a seven-point scale ranging from "strongly disagree" to "strongly agree".

Epistemological Beliefs Survey (EBS)

The EBS is a 36-item epistemological belief measure (Wood and Kardash 2002) adapted from two earlier models - Schommer's (1990) Epistemological Questionnaire, and Jehng, Johnson, and Anderson's (1993) Epistemological Scale. Factor analyses of these earlier epistemological measures tends to partition epistemological beliefs into four, and sometimes five, groupings (DeBacker, Crowson, Beesley, Thoma, and Hestevold, 2000; Jehng et al 1993; Schommer, 1990; Wood and Kardash, 2002). Although there is a great deal of variation in language definition and factoring, the five groupings can generally be understood as 1) structure of knowledge, 2) knowledge construction and modification. 3) source of knowledge, 4) control of learning, and 5) speed of learning. The current study, used only the two 'nature of knowledge' factors of the EBS (Wood and Kardash, 2002). These are structure of knowledge (EBScomp) and knowledge construction and modification (EBSflex).

Structure of knowledge EBScomp (10 items; α = .72) is thought to capture epistemological beliefs that range from knowledge is constructed from discrete unambiguous facts and pieces of information (simple), to knowledge is composed of ambiguous, complex, interrelated

conceptualizations, often with no single right answer (complex). It is expected that this dimension should capture the complexity construct proposed in the hypothesis of this study.

Items that factor into the knowledge construction and modification EBSflex (10 items; α = .66) dimension are thought to capture epistemological beliefs ranging from knowledge is certain and unchanging, is passively received, and should be accepted at face value, to knowledge is tentative, constantly evolving, and should be frequently questioned and reevaluated. This dimension should reflect the flexibility construct of the current hypothesis.

Dogmatism Scale (DOG)

The DOG scale is an attempt to develop a more internally consistent measure of dogmatism as apposed to the D-scale developed in the 1960's (Altemeyer 2002). The DOG scale is a 20 item measure (α = .90) that operationally defines dogmatism as "relatively unchanging unjustifiable certainty". Although many of the studies using the DOG scale center on religious topics, the items were developed to be equally applicable to any belief system (Altemeyer 2002).

In the current study it was expected that the DOG scale will have a high correlation with the knowledge construction and modification dimension of the EBS, thus serving as a second measure of the flexibility construct of the proposed hypothesis.

Need For Cognition Scale (NFC)

The NFC scale is thought to capture qualities that relate to an individuals' desire to understand, engage in, and enjoy thinking, and to organize and make relevant the individual's personal experience (Cacioppo, and Petty, 1982). NFC can further be understood as reflecting intrinsic cognitive motivation as opposed to static intellectual ability (Cacioppo, Petty, Feinstein, and Jarvis, 1996). Cacioppo et al (1996) state that individuals who score high in NFC have active, open minds, enjoy engaging in effortful thinking, and display a desire to organize the acquisition of information in personally relevant ways.

NFC has negative correlations with dogmatism, authoritarianism, intolerance for ambiguity, and need for closure, and positive correlations with introspectiveness, objectivism, openness to experience, and attribution complexity, where the latter variable indicates a "tendency

to generate complex attributions for human behavior" (Cacioppo et al 1996). The NFC scale used in the present study was the short 18 item version (α = .90) (Cacioppo, Petty, and Kao, 1984). The NFC was expected to correlate with the structure of knowledge dimension of the EBS, and thus serve as a second measure of the complexity construct of the current hypothesis.

Card Sort Task

In addition to the questionnaire measures, participants performed a card sorting task (Linville 1987; McMahon, Showers, Rieder, Abramson and Hogan, 2003; Showers 1992; Showers and Kevlyn, 1999; Showers and Zeigler-Hill, 2007; Zeigler-Hill and Showers, 2007) where they formed groups of self-attributes by sorting cards with descriptors or adjectives printed on them, and then recorded them as a list.

The sorting task is adapted from Linville (1987) and Showers (1992) (see also McMahon, Showers, Rieder, Abramson, and Hogan, 2003; Showers and Kevlyn, 1999; Showers and Zeigler-Hill, 2007; Zeigler-Hill and Showers, 2007). In this task, the participant was given 40 cards with a self-descriptive attribute or adjective on each. Half (20) of the cards have positive attributes, e.g..

'mature', 'hard working', and half (20) have negative attributes, e.g., 'isolated', 'tense' (Zeigler-Hill and Showers, 2007).

This task is thought to assess an individual's self-structure. According to this model (Linville 1987; Margolin and Niedenthal 2000; McMahon et al, 2003; Showers 1992) individuals organize self-aspects across multiple domain-specific selves which consist of self-beliefs related to those domains. The Showers (1992) version of the task employed here identifies two, mutually exclusive forms of self-structuring and evaluation representing opposite ends of a continuum: an integrated self, and a compartmentalized self. A compartmentalized self would consist of self groupings that had mostly negative or positive attributes. An integrative self would have a mix of both negative and positive attributes across the self groupings. A participant's sort can be located along this continuum by the following measure which will be known as the integration score. First, an overall ratio of negative traits to positive traits is determined for each group in a participant's sort. Second, these ratios are averaged across groups.

In addition to the integration score, the present study will assess what Linville describes as self-complexity (SC). Linville (1987) identifies self complexity first from the number of self groupings a subject creates, and second from the degree of divergence of the groupings. For instance, a potential sort that contains few groups, and utilizes the same attributes repeatedly across these groups would qualify as low complexity, whereas a sort resulting in several groups, utilizing different attributes in each group would qualify as high complexity. This way of assessing complexity seems to stress differentiation of self-aspects. To asses the self complexity of participants' sorts following Linville (1987), a measure of dimensionality based on the H statistic will be used, where n is the total number of attributes, and ni is the number of attributes in a group.

$$SC = \log_2 n - (\Sigma_i\, n_i \log_2 n_i)/n,$$

The greater the number of groups created, the fewer traits in those groups, and the less redundancy of attributes between groups, the higher the value of SC will be. High self-complexity is a function of larger numbers of

groups, with fewer traits and less redundancy of attributes between groups.

Two additional measures of self-complexity were employed in the present study. A repetition score (RS) was computed, where repeated use of attributes (cards) in multiple groups is counted. For instance, if a card is used in two groups it counts as one repetition, where as if it is used in three groups it counts as three repetitions. Continuing in this manner, the same trait used in four groups represents 6 repetitions, etc. The total number of repetitions is then divided by the number (40) of possible traits. The last sorting task measure of self complexity is the total number of groups (TNG) in a participant's sorts. TNG indicates the number of self-aspects comprising the self concept; the more self aspects the greater the complexity of the self structure.

Showers describes another sorting task measure of possible relevance to this study. This is a phi (φ) coefficient,

$$\phi = \sqrt{\frac{\chi^2}{N}}.$$

which is based on the chi-square statistic computed from the individual sorts of each subject. Each sort is

arranged in a contingency table, where the columns represent the individual groupings formed by a participant, and the rows provide the number of negative attributes (row 1) and the number of positive attributes (row 2) in each of the individual groupings. The phi indexes the extent to which the proportion of negative to positive traits is varying from one group (self-aspect) to another in the participant's sort. Phi ranges from 0 to 1, where 0 purportedly equals homogeneity, stability, or a lack of variability across groups. This measure will be known as variability of structure (VS) because it indicates the extent to which the self aspects share the same internal structure in terms of the valence of the traits within the group.

Originally Linville (1987) and Showers (1992) used 33 cards. This was later expanded to 40 cards (Showers, Abramson and Hogan, 1998; Showers and Kevlyn, 1999), 20 with positive attributes, and 20 with negative attributes to assess compartmentalization. The current study intends to use 40 cards.

The administration of the card sort task was as follows. Subjects were given 40 cards with descriptive adjectives, half (20) negative (e.g., tense), and half (20)

positive (e.g., confident) printed on them. The cards all had a corresponding number on each. Also they were given two legal sized papers with 14 columns on them.

Participants were told to think about different aspects of themselves and their life as they arrange the cards into groups, and then record the corresponding numbers into the columns on the paper. They were told they can make one, two, or three groups at a time, as they think of them, and then mix the cards and resort into further groupings. They could make as many or as few groups as they wanted, and they could re-use or not use any of the cards.

Participants were given 25 minutes to perform the card sort, and an additional 5 minutes to finish if they needed. Subjects were told to use all the time they needed as this is a free association task. Only six participants could perform the card sort task at a time, as there is a tendency for participants who finish early to 'suggest' to those taking longer that they should stop.

The claim of the present study was that identity or self-concept is reciprocally and mutually related to the levels of flexibility and complexity in a person's belief system. Specifically, a detached identity, featuring high levels of integration across multiple and divergent self

concept groupings should show higher levels of flexibility and complexity, while a relatively attached identity, featuring substantial compartmentalization across few and homogeneous self concept groupings should show lower levels of flexibility and complexity. Consequently it is expected that higher complexity/flexibility as assessed by the EBS, NFC, and DOG measures will be positively related to greater integration, a greater number of self-aspects, and greater divergence of self aspects on the sorting task.

CHAPTER SEVEN

RESULTS

Reliability of Scales

Preparatory to testing the hypotheses of this study, reliabilities were computed for each of the four scales in the study using the present sample. Results indicated that the two EBS scales (Wood and Kardash, 2002) had reliabilities that were below those reported in the literature. Dropping specific items from these scales, however, improved their reliability. One item was dropped from the EBScomp scale yielding an alpha of .67 and three items were dropped from the EBSflex scale resulting in an alpha of .60. Wood and Kardash (2002) report alphas of .72 and .66, respectively, for these two scales.

Correlations of Complexity and Flexibility

The first hypothesis of this study involved the claim that the four scales employed as measures of complexity and flexibility should be interrelated. This should involve significant negative correlations between dogmatism and each of the other three scales and significant positive

correlations for all remaining pairings. In addition, the two alleged measures of complexity - NFC and EBScomp - should be more highly interrelated than either is to the two alleged measures of flexibility. In addition, the two alleged measures of flexibility - dogmatism and EBSflex - should be more highly interrelated than either is to the alleged measures of complexity.

To assess the first hypothesis, a series of correlations was run (See table 2).

Table 2
Correlations of scales to measure complexity and flexibility

	NFC	DOG	EBScomp	EBSflex
NFC	1.	.025	.272**	.010
DOG		1.	-.119	-.175
EBScomp			1.	-.057
EBSflex				1.

Note: * $P < .05$ ** $P < .01$, 94 participants. NFC = need for cognition, DOG = dogmatism, EBS comp = EBScomp, EBS flex = EBSflex.

Results indicated that hypothesis 1 is only partially supported. It was expected that the four scales would correlate with one another, with the stronger relationships

being between the two complexity measures, as well as between the two flexibility measures. However all correlations were non-significant with the exception of the correlation between NFC and EBScomp. It should also be noted that the expected negative correlation between dogmatism and EBSflex did obtain prior to modification of the EBS scales to improve reliability, r (92) = -.23, p < .025.

Tests of the difference between correlations were conducted to determine whether or not the additional claim of hypothesis 1 regarding which correlations would be the strongest was consistent with the findings. Results indicated that the correlation between NFC and EBScomp was higher than either the correlation between EBScomp and dogmatism, z (94) = 2.96, p <.007, or between EBScomp and EBSflex, z (94) = 2.27, p < .023. This is consistent with expectations. The correlation between the two complexity measures did not differ significantly from the correlation between NFC and either dogmatism, z (94) = 1.71, p < .087, or EBScomp, z (94) = 1.81, p < .07, though trends were present that approached significance. By contrast, the correlation between the two flexibility measures - dogmatism and EBSflex - was not greater than the

correlations between either of these measures and each of the complexity measures.

Card Sort Analyses

The card sorting task was employed to test the second and primary hypothesis which held that complexity and flexibility in the belief system would be related to self structure. The card sorting task was expected to capture several features regarding self structure. Specifically, these were number of self aspects within the self concept, divergence of self aspects across the self concept, integration/compartmentalization, and variation between self aspects.

The number of groups (TNG) within a sort is regarded as a measure of the number of self aspects that make up the self concept and should be related to complexity of the belief system., The self-complexity (SC) and repetition scores (RS) are measures of diversity or differentiation across self-aspects. Ratios of negative and positive traits within and across groups should indicate integration/compartmentalization (IS), and finally the phi score seems best to indicate variation between and across groups (VS).

To determine the degree of similarity among the various measures of performance on the card sort task, a series of correlations was conducted among the above indices of self-structure. See Table 3 for the results.

Table 3
Correlations scores for card sort task

	TGN	SC	RS	IS	VS
TNG	1.	-.501**	.647**	.193	.115
SC		1.	-.775**	-.227*	-.015
RS			1.	.284**	-.240*
IS				1.	-.326**
VS					1.

Note: * $p < .05$ ** $p < .01$, 94 participants. TNG = total number of groups SC = self complexity score, RS = repetition score, IS = integration score, VS = negative/positive variation score.

From Table 3 it can be seen that patterns of intercorrelations are present that are not consistent with assumptions in the literature about what these variables are measuring. The TNG, SC, and RS are purportedly measuring complexity of the self. According to the literature, TNG as a measure of the number of self aspects should be positively related to SC and each of these variables should be negatively related to RS. This was not

the case. Also, the measure of integration - IS - should be positively related to TNG and SC and negatively related to RS. This pattern also was generally not found.

These results make it unclear what aspects of self structure the variables in the study are measuring. However, one possible interpretation for these findings is that the 40 card limit of the sort task is a problem because it means that the use of more traits in a sort is going to drive RS upwards and SC downwards. At the same time, the use of larger numbers of traits could be construed as indicating greater complexity. The number of traits is, for example, closely associated with the number of groups - a measure of self-complexity. On this basis, it may be more accurate to consider low scores on SC and high scores on RS as indicating complexity. In addition, RS may actually be measuring integration in that some degree of repetition across groups may be an important integrative factor.

One final result to point out from Table 2 is that the two variables (IS, VS) related to integration (Showers, 1992; McMahon, Showers, Rieder, Abramson, and Hogan, 2003; Showers and Kevlyn, 1999; Showers and Zeigler-Hill, 2007;

Zeigler-Hill and Showers, 2007) were negatively correlated with each as would be expected.

Complexity and Flexibility and Card Sort Analysis

A second set of correlations was conducted between the four measures of complexity/flexibility of the belief system and the indices of self structure from the sorting task. The results are presented in table 4. As can be seen, only NFC and EBSflex had any significant correlations with self structure. Both measures had negative correlations with SC score and positive correlations with RS. In addition, NFC had a positive correlation with number of groups. Again, if RS and SC are reversed by the argument made above, the directions of these relationships make sense given the theoretical framework of the study.

Table 4
Correlations of scales with card sort scores

	NFC	EBS comp	DOG	EBS flex
TNG	.211*	.179	.114	.152
SC	-.311**	-.053	.111	-.274**
RS	.280**	.183	.139	.248*
IS	-.063	.039	.007	-.112
VS	.001	-.016	.043	.051

Note: * $P < .05$ ** $P < .01$, 94 participants. NFC = need for cognition, EBS comp = EBScomp, DOG = dogmatism, EBS flex = EBSflex, TNG = total number of groups, SC = self complexity score, RS = repetition score, IS = integration score, VS = negative/positive variation score.

A regression analysis was conducted to determine whether the significant complexity measure (NFC) and the significant flexibility measure (EBSflex) each make non-redundant, independent, contributions to explaining variance of the two primary sorting task measures. Two regression analyses were conducted - one predicting SC (self-complexity) score and the other predicting RS (repetition score). No demographic variables were related to the two criterion variables. For this reason, demographic variables were not entered as controls in the analysis.

Results from the regression to predict SC indicate that NFC, $\beta = -.31$, $P < .002$, and EBSflex, $\beta = -.27$, $P < .005$, each made significant, independent contributions to the prediction of SC, $R^2 = .17$, $F\ (2.92) = 9.45$, $p < .001$. Likewise, results from the regression to predict RS indicated that NFC, $\beta = .28$ $p < .005$, and EBSflex, $\beta = .25$, $p < .013$, each made significant, independent contributions to predicting RS, $R^2 = .14$, $F(2, 92) = 7.48$, $p < 001$. These regressions indicate that need for cognition and EBS flexibility are capturing different aspects of the card sort variables SC and RS. Those qualities appear to be complexity and flexibility.

Supplementary Analysis

There were some interesting and potentially instructive correlations among the variables of the study which did not pertain to either of the hypotheses being assessed. These are reported here and will be discussed below. First, the EBS scales were related to parent education and participant age. Specifically, EBScomp was positively related to both mother's education, $r\ (94) = .21$, $p < .045$, and father's education, $r\ (94) = .22$, $p < .034$. This is sensible, and in accord with the general theme of

the thesis. More educated parents would likely provide environments that result in greater complexity and flexibility in a person's belief system.

EBSflex was positively related to participant age, r (94) = .28, p<.006. This again is sensible, as it is expected that an individual should develop grater flexibility as they mature. However, it also could be that at some point the flexibility dimension reverses as people become *set in their ways*. The mean age of the present study was 25, which is relatively young.

Interestingly, the IS was negatively related to both year in college, r (94) = - .25, p<.016, and age r (94) = - .25, p <.017. This result is counter intuitive. Age and education should lead to better integration. This could be a problem of participant population; it is possible that the collage experience creates particular stressors that result in compartmentalization.

Finally, religious importance was negatively related to the TNG (total number of groups) or self aspects, r (94) = - .21, p < .04, and positively related to DOG, r (94) = .41 p < .00. Again this is sensible as dogmatism and religion have been noted to correlate by other researchers (Crowson, DeBacker, and Davis, 2007). Dogmatism is also

characterized as holding simplistic views (Altemeyer, 2002) which should lead to fewer self aspects.

CHAPTER EIGHT

DISCUSSION

The first hypothesis of this study was that the four scales measuring complexity and flexibility of the belief system should correlate with each other; the stronger relationships should be between NFC and EBScomp - the two proposed measures of complexity - and between DOG and EBSflex - the two proposed measures of flexibility. The results indicated that only NFC and EBScomp were significantly related, although DOG and EBSflex did correlate significantly before the two EBS scales were modified in order to improve their reliability. The relationship between the two complexity measures was generally stronger than relations between either of these and each of the other scales. These results are only partially supportive of the first hypothesis. There is support here for a claim that the complexity measures share some common variance. However, it is clear that these four scales are substantially independent. This indicates these scales are likely measuring varied aspects of complexity and flexibility.

The second, and primary, hypothesis of the study involved a claim that degrees of complexity and flexibility in the overall belief system will be related to complexity/flexibility of the self structure and to the extent to which the individual's identity is separated from the belief system. Specifically, it was expected that the NFC and both EBS scales would be positively associated with larger numbers of self aspects, fewer repetitions, and greater integration of self-aspects on the sort task, while the DOG would be positively associated with low numbers of self aspects, higher repetition, and greater compartmentalization.

Self structure was measured through five variables. The three variables based on Linville's (1987) work were the number of self aspects, TNG, the number of repetitions of traits across self aspects or groups, RS, and self complexity, SC, assessed through a log statistic that was sensitive to the total number of groups, number of traits per group, and the potential for repetition, based on the 40 card/trait limit. Two variables were based in the work of Showers (1992) and colleagues. Integration with respect to self structure or self concept was measured as the extent to which negative and positive traits were combined

within individual self aspects or groupings, IS, representing realistic and stable self representation. A second variable from Showers pertaining to the sort task was the variability of structure score, VS This variable is based on the phi statistic and was originally expected to capture integration/compartmentalization (Showers 1992). However, as discussed in the Method section, this variable is actually assessing negative/positive ratio variation across groups within a particular sort. Higher variation achieved higher scores. Although it is possible to have an integrated sort that also had a high VS, it was much more likely that compartmentalized sorts would result, as integration tended to produce homogeneity.

Inter-correlations among these five measures generated a pattern that differs from expectations found in the literature. It was argued above that RS and SC should be reversed when interpreted as measures of complexity. Doing so yields sensible relationships among the card sort variables.

Results of the present study with regard to the second hypothesis indicate limited support. Two of the four scales correlated with aspects of self structure as assessed by the card sort task. These were NFC and EBSflex - a presumed

measure of complexity of the belief system and a presumed measure of flexibility, respectively. Regression analyses also indicated that NFC and EBSflex made independent contributions to predicting self structure.

Why wasn't there more support for hypothesis two? One explanation could be limitations regarding the card sort task. First, the instructions to the participant were vague. The original intention of this ambiguity was to avoid cueing or prompting participants. According to the literature, the goal was for the participant to select the structure of their groups solely through the process of sorting through the deck in a free associative manner.

Another problem was that the 40 card limit produces a condition where the creation of many groups with significant numbers of cards/traits per group naturally leads to repetition of trait/card use across groups. While repetition is treated in the literature as an indication of *low* self complexity, a greater number of groups is treated as indicating *high* complexity. These variables are contradictory. In addition, the SC based on the natural log of 40 only assesses redundancy as the use of more than 40 cards; it does not account for actual repetition of cards used in multiple groups. In fact, the SC seemed to measure

self complexity in reverse; low numbers of groups and low numbers of traits within groups yielded the higher scores, while according to the literature this result should be an indication of low self complexity. By contrast, high numbers of groups and high trait numbers within groups yielded relatively lower SC scores, while these outcomes are interpreted as indicating high complexity in the literature.

The above discussion indicates methodological problems with the sort task and its scoring. The issue of group divergence is potentially a theoretical problem as well. According to the literature, the greater the distinction between groups the greater the self complexity; operationally defined as a lack of trait/card repetition. An alternative view could be that some core characteristics of the self concept *should* be generalized to the various self aspects. From this position there would be an optimal amount of redundancy, where too much redundancy would result in homogeneity of the self aspects indicating low self complexity, while extreme heterogeneity of the self aspects could lead to instability of the self concept. This suggestion of a possible non-linear effect is partially

supported by correlations among the variables IS, VS, RS, and SC.

As has been discussed, a high IS, indicating integration of negative and positive traits within the participant's groups, is also indicating a kind of balance. The higher the IS score, the more of a balance there is within groups between negative and positive traits. According to the literature, this balance helps maintain stability of the self structure. By contrast, the VS is a measure of homogeneity across groups. A high VS score means significant heterogeneity or variability of internal structure across groups and this should be tantamount to lower stability. So IS and VS should be inversely related. This claim is supported by the negative correlation between IS and VS

SC and RS also capture homogeneity in a sense but do so directly from trait repetition, a characteristic that is not involved in computing the integration score. The correlations between IS, RS, and SC suggest a nexus of group homogeneity. The IS branch manifesting through integration; the RS and SC branch manifesting through trait repletion. This notion is further supported by the negative correlation between VS and RS.

The findings of the current research show important parallels with the findings of Kardash and Scholes (1996). Their research found no direct relationship between NFC and Schommer's (1990) epistemological questionnaire, but did find that both NFC and the *certain knowledge* factor (in our case EBSflex) made significant unique contributions to an individuals ability to suspend absolute conclusions about ambiguously presented material regarding whether HIV causes AIDS. This seems to indicate that both complexity and flexibility of the belief system helped facilitate the holding of multiple competing claims simultaneously, a sign of complexity, while resisting absolute conclusions in an effort to remain open to alternative possibilities, a sign of flexibility. The present study similarly found that complexity and flexibility measures made unique contributions to predicting more adaptive self structures.

The findings of the current research are in partial conflict with previous research regarding self structure. Both Linville (1985; 1987) and Margolin and Niedenthal (2000) state that self complexity stems from multiple self aspects and the degree of divergence between self aspects. The current findings are in agreement with the first assertion; TNG had a significant positive correlation with

NFC indicating more self aspects are related to greater complexity. The conflict is with self aspect divergence. As was addressed earlier in the discussion, high divergence of self aspects (as measured by SC and RS) was not associated with larger numbers of self aspects, TNG. One alternative explanation for this is that some lack of divergence or differentiation of self aspects produces a stabilizing influence on the self concept. Previous research has shown that integrated self aspects demonstrate a more realistic self view, greater complexity and more stability (McMahan et al 1999; Showers and Zeigler-Hill 2007; Zeigler-Hill and Showers 2007). Markus and Kunda (1986) attempting to resolve the contradictory problem of stability and malleability of the self structure introduce the notion of a working self, where the "working self concept consists, then, of one's core self conceptions that are tied to the immediate social circumstances" (p859). It could be that an optimal number of repeated, core traits would allow the working self to stay tethered to the core structure of the self concept.

Enough support for the hypotheses of the current study was obtained to indicate further directions for future research. First, the flexibility measures DOG and EBSflex

did not reach a significant correlation. These scales could be checked again using a more diverse population pool, and cross checked with other similar scales, such as need for closure and need for structure. It could be that the flexibility dynamic of the belief system is more elusive. Comparing and contrasting the current methods for evaluating this construct could prove instructive.

The card sort task appears to have problems both conceptually and methodologically. The conceptual problem of self aspect divergence and the roles of heterogeneity verses homogeneity a complex or flexible self structure have been discussed at length above. A more refined and thorough method for addressing this problem seems warranted. First the 40 card limit is an obvious pit fall, as larger numbers of groups will inevitably lead to card reuse. An increase in the number of cards could help mitigate that problem. Also there is the nature of the groups themselves. The IS and VS of the current study partly assessed the structure of the groups and their relationship to each other, but a deeper assessment of the individual groups and their contextual fit within the set also seems warranted. A modification that could address this could be some form of interview with the participant

that elicits elaborations regarding the nature of their sort groups. This could at the same time address the problem of ambiguity regarding instructions addressed above. Because an interview method would be conducted one participant at a time, two other issues could be addressed as well. One is the social effect, the need to stop at the same time other participants do. The other is the incentive to do a thorough and complete sort in anticipation of the discussion with the experimenter. Finally it is difficult to know just to what extent, if at all, the card sort task is genuinely capturing self structure. It could be instructive to compare card sort finding directly with other methods of evaluating self structure and identity.

Conclusion

Generally speaking, this study was concerned with how individuals structure their beliefs. Through out history, and in contemporary society there has been great divergence in what people believe and why. One may wonder how it could ever be thought that the earth was flat. But equally so it is easy to imagine how one could have such faith that the earth was round when all convention indicated it was not.

It was not child like faith, but an understanding of geometric formulas that lead 15th century thinks to surmise the earth was round; it was personal and anecdotal experience, and an inability to imagine that one could be wrong that held people in the belief that the earth was flat.

The human condition is peppered similar examples; conventional beliefs are held with little or no question, in the worst cases mans identity is tenaciously tied to those beliefs, while progress often results from a detached identity, the flexibility to imagine accepted beliefs could be wrong, and the complexity to imagine alternatives.

"We shall never be certain that our dearest truth may not be the most useful form of error" Nietzsche. (Durant, 1929, p. 30).

APPENDIX A

GENERAL INSTRUCTION TO PARTICIPANT

APPENDIX A

GENERAL INSTRUCTIONS

You have been given three questionnaires and a general information form. First fill out the information form, and then each of the questionnaires in order. Each is a different method of assessing how people form beliefs and think about themselves and issues that are important to their life. Consider each statement and use the scale below to indicate the extent to which you AGREE OR DISAGREE with the statement There are no right or wrong answers; simply give the response you think most closely represents how you feel.

Strongly Disagree	**Disagree**	**Mildly Disagree**	**Neutral**	**Mildly Agree**	**Agree**	**Strongly Agree**
1	**2**	**3**	**4**	**5**	**6**	**7**

APPENDIX B

GENERAL INFORMATION

Appendix B

GENERAL INFORMATION

Participant # _____

GENERAL INFORMATION

1. What is your age? _____

2. What is your **current** marital status? (check one)
___ married ___ never married ___ divorced or separated
___widowed

3. What is your year in college? (check one)
_____ Freshman _____ Sophomore _____ Junior _____ Senior

4. What is your major in college?
_____.

5. What was your total family income last year (from all sources, before taxes)? This refers tothe summed incomes of **all** individuals living in your home:

___ less than 15,999	___ $50,000 to $59,999
___ $15,999 to $19,999	___ $60,000 to $69,999
___ $20,000 to $29,999	___ $70,000 to $79,999
___ $30,000 to $39,999	___ $80,000 to $89,999
___ $40,000 to $49,999	___ $90,000 or more

6. Please tell us *who lives in your house* and fill in the appropriate numbers:
a) Total number of children (ages 0 to 18) _____
Ages:_____
b) Number of other adults (over 18) **besides** yourself
_____

7. What *race* do you consider yourself to be? (check one)
___ Caucasian/Anglo-American/White
___ Native American
___ African/African-American/Black
___ Pacific Islander
___ Hispanic/Latino/Latina
___ Asian
___ Middle Eastern (Arabic)

___ Other (specify) _____

8. What is the highest level of education that your **MOTHER** completed?
___ Grade 5 or below.
___ Between grade 5 and 8.
___ Some high school but didn't finish.
___ Completed high school degree.
___ Some college.
___ Completed college degree.
___ Graduate degree.

9. What is the highest level of education that your **FATHER** completed?
___ Grade 5 or below.
___ Between grade 5 and 8.
___ Some high school but didn't finish.
___ Completed high school degree.
___ Some college.
___ Completed college degree.
___ Graduate degree.

10. What is your employment status? (check one)

___working part time
___working full time
___unemployed

11. Please indicate your best estimate of your current, cumulative GPA covering the sum of your college courses to date: _____

12. Please indicate the religious/spiritual belief that best defines you

___I do not have any religious/spiritual belief

___I am agnostic regarding religious/spiritual belief

___I prefer not to define my religious/spiritual belief

___I follow established traditional religious/spiritual belief

13. Please indicate the importance of religious/spiritual belief

___ Not important at all

___Somewhat important

___Very important

14. Please indicate how often you attend religious/spiritual services

___Never

___Only on special occasions

___A few times a year

___Once a month

___Once a week

___Daily

15. Please indicate your political affiliation

___ No affiliation

___Democrat

___Republican

___Libertarian

___Green Party

___Tea Party

16. Please indicate the political philosophy that best describes you

___No political philosophy

___Very Liberal

___Somewhat Liberal

___Liberal

___Conservative

___Somewhat Conservative

___Very Conservative

APPENDIX C

DOGMATISM SCALE: (DOG)

APPENDIX C

DOGMATISM SCALE: (DOG)

Strongly Disagree	**Disagree**	**Mildly Disagree**	**Neutral**	**Mildly Agree**	**Agree**	**Strongly Agree**
1	**2**	**3**	**4**	**5**	**6**	**7**

X. I may be wrong about some of the little things in life, but I am quite certain I am right about all the BIG issues.

Y. Someday I will probably think that many of my present ideas were wrong.

____ 1. Anyone who is honestly and truly seeking the truth will end up believing what I believe.

____ 2. There are so many things we have not discovered yet, nobody should be absolutely certain his beliefs are right.*

____ 3. The things I believe in are so completely true, I could never doubt them

____ 4. I have never discovered a system of beliefs that explains everything to my satisfaction. *

____ 5. It is best to be open to all possibilities and ready to reevaluate all your beliefs.*

____ 6. My opinions are right and will stand the test of time.

____ 7. Flexibility is a real virtue in thinking, since you may well be wrong. *

____ 8. My opinions and beliefs fit together perfectly to make a crystal-clear "picture" of things.

____ 9. There are no discoveries or facts that could possibly make me change my mind about the things that matter most in life.

____ 10. I am a long way from reaching final conclusions about the central issues in life.*

____ 11. The person who is absolutely certain she has the truth will probably never find it.*

____ 12. I am absolutely certain that my ideas about the fundamental issues in life are correct.

____ 13. The people who disagree with me may well turn out to be right.*

____ 14. I am so sure I am right about the important things in life, there is no evidence that could convince me otherwise.

____ 15. If you are "open-minded" about the most important things in life, you will probably reach the wrong conclusions.

____ 16. Twenty years from now, some of my opinions about the important things in life will probably have changed.*

____ 17. "Flexibility in thinking" is another name for being "wishy-washy".

____ 18. No one knows all the essential truths about the central issues in life. *

____ 19. Someday I will probably realize my present ideas about the BIG issues are wrong. *

____ 20. People who disagree with me are just plain wrong and often evil as well.

- items requiring reverse scoring.
-

APPENDIX D

NEED FOR COGNITION (NFC)

APPENDIX D

NEED FOR COGNITION (NFC)

Strongly Disagree	Disagree	Mildly Disagree	Neutral	Mildly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

____ 1. I would prefer complex to simple problems.

____ 2. I like to have the responsibility of handling a situation that requires a lot of thinking.

____ 3. Thinking is not my idea of fun."

____ 4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities."

____ 5. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.8

____ 6. I find satisfaction in deliberating hard and for long hours.

____ 7. I only think as hard as I have to."

____ 8. I prefer to think about small, daily projects to long-term ones.*

____ 9. I like tasks that require little thought once I've learned them.*

____ 10. The idea of relying on thought to make my way to the top appeals to me.

____ 11. I really enjoy a task that involves coming up with new solutions to problems.

____ 12. Learning new ways to think doesn't excite me very much.*

____ 13. I prefer my life to be filled with puzzles that I must solve.

____ 14. The notion of thinking abstractly is appealing to me.

____ 15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

____ 16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.*

____ 17. It's enough for me that something gets the job done; I don't care how or why it works.*

____ 18. I usually end up deliberating about issues even when they do not affect me personally.

- items reverse scoring.
-

APPENDIX E

EPISTEMOLOGICAL BELIEF SURVEY (EBS)

APPENDIX E

EPISTEMOLOGICAL BELIEFS SURVEY (EBS)

Note: uses only 20 of the 36 item scale; 10 from Simple Knowledge, EBScomp and 10 from Certain Knowledge, EBSflex.

Strongly Disagree	**Disagree**	**Mildly Disagree**	**Neutral**	**Mildly Agree**	**Agree**	**Strongly Agree**
1	**2**	**3**	**4**	**5**	**6**	**7**

____ 1. I like information to be presented in a straightforward fashion; I don't like having to read between the lines.* (c)

____ 2. Today's facts may be tomorrow's fiction. (f)

____ 3. If professors would stick more to the facts and do less theorizing, one could get more out of college.* (c)

____ 4. Wisdom is not knowing the answers, but knowing how to find the answers. (f)

____ 5. It is annoying to listen to lecturers who cannot seem to make up their mind as to what they really believe.* (c)

____ 6. A sentence has little meaning unless you know the situation in which it was spoken. (f)

____ 7. I really appreciate instructors who organize their lectures carefully and then stick to their plan.* (c)

____ 8. Forming your own ideas is more important than learning what the textbooks say. (f)

____ 9. Even advice from experts should be questioned. (f)

____ 10. When I study, I look for the specific facts.* (c)

____ 11. I try my best to combine information across chapters or even across classes.(f)

____ 12. It's a waste of time to work on problems that have no possibility of coming out with a clear-cut answer.* (c)

____ 13. I find it refreshing to think about issues that experts agree on.(f)

____ 14. When I learn, I prefer to make things as simple as possible.*(c)

____ 15. A really good way to understand a textbook is to organize the information according to your own personal scheme. (f)

____ 16. The most important part of scientific work is original thinking.(f)

____ 17. The best thing about science courses is that most problems have only one right answer.* (c)

____ 18. It is difficult to learn from a textbook unless you start from the beginning and master one section at a time.*(c)

____ 19. You should evaluate the accuracy of information in textbooks if you are familiar with the topic.(f)

____ 20. A good teacher's job is to keep students from wandering from the right track.*(c)

* items reverse scoring.
(c) complexity
(f) flexibility

APPENDIX F

INSTRUCTIONS TO BE GIVEN AND READ TO PARTICIPANTS AT THE BEGINNING OF THE CARD SORT TASK.

APPENDIX F

INSTRUCTIONS TO BE GIVEN AND READ TO

PARTICIPANTS AT THE BEGINNING

OF THE CARD SORT TASK.

Next you will be doing a card sorting task. You have been given 40 cards and two recording sheets. Each card has a number, and trait or characteristic on it. Your task is to think about yourself and your life and form the cards into groups that you think go together, and then record the number from the card onto the recording sheet. You can form as many or as few groups as you think sensibly represent yourself and your life. You can form one group at a time, or several groups at a time before recording your groups on to the record sheet. If you wish, you can label your groups on the record sheet. You are encouraged to re-shuffle the cards and form new groups as often as you need to. **Keep in mind this is a free association task; allow yourself to be thoughtful and creative as you sort through the cards and form your groups.** You have 25 minutes for this task, with a 5 minute grace to finish what ever groups you may be working on. You are encouraged to use all the time you need.

APPENDIX G

SORT TASK ITEMS TO BE PRINTED

ON INDEX CARDS

APPENDIX G

SORT TASK ITEMS TO BE PRINTED

ON INDEX CARDS

1.	Successful	2.	Disagreeing
3.	Giving	4.	Hopeless
5.	Capable	6.	Lazy
7.	Confident	8.	Self-centered
9.	Comfortable	10.	Unloved
11.	Independent	12.	Not the "real me"
13.	Needed	14.	Immature
15.	Communicative	16.	Weary
17.	Mature	18.	Uncomfortable
19.	Organized	20.	Sad & Blue
21.	Intelligent	22.	Incompetent
23.	Lovable	24.	Insecure
25.	Fun & Entertaining	26.	Worthless
27.	Interested	28.	Inferior
29.	Outgoing	30.	Irritable
31.	Energetic	32.	Like a failure
33.	Hardworking	34.	Isolated
35.	Happy	36.	Indecisive
37.	Friendly	38.	Disorganized
39.	Optimistic	40.	Tense

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