A DESCRIPTIVE STUDY OF THE INNOVATION TEAM PERSONALITY PROFILES OF SELECTED COMPANIES IN THE DURBAN REGION

BY

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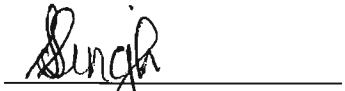
PREFACE

This study was carried out under the supervision of Mr Marc Salence.

This dissertation represents the original work of the author and has not been submitted in any form to another university. Wherever use was made of the work of others, it has been duly acknowledged.



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ABSTRACT

Innovation is a necessity, not a nicety – but many companies still think of innovation as being important rather than urgent. For innovation to be successful, it requires different behaviours and new ways of thinking. It is fundamentally a human activity; hence the people that make innovation a reality are the inner workings of this process.

In this study, a measurement tool has been designed to assess the different types of personalities that exist in new product development teams. A model has also been proposed. This model classifies the different personalities according to their dominant traits. It was derived from a tool that is well known within many innovation driven organisations: the model for assessing brand personalities that is very similar to the Heylen model. Using this model, a new model is proposed for the assessment of individual personalities.

The individual personality types were established and the overall team structure was examined to determine if diverse personality innovation teams have any correlation with the perceived output of innovation. This study served the purpose of determining if this relationship exists as well as introducing a new model for the classification of different personality types.

Three companies within the Durban region were selected and upon investigation it was learned that there does exist a relationship between diverse personality innovation teams and the perceived output of the process. It was learned that diversity does contribute to the measured innovation output. There were four different personality types classified. It was established that too many of one or more type of personality (e.g. originators or effectors) or the lack of other types (in this case motivators) in a new product development team hinders the optimal output of the process i.e. it effectively delays innovation and a valuable market offering since the abundant personality types dominate with their respective function/s and inhibit other critical functions for the innovation journey to run smoothly. Effective innovation is about each personality type adding his/ her contribution to the process. In this study it was established that not many motivators were identified in teams and an increase in originators and effectors correlated with a decrease in perceived innovation output. Each team member exists in a team at the opportunity cost of another, and it is essential that the right mix of personalities be present for effective innovation.

ACKNOWLEDGEMENTS

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INTRODUCTION

1.1 Introduction

Innovation has been coined by the New Economy as a critical path for organisations to achieve and maintain success. Innovation refers to the overall process whereby an invention is transformed into a commercial product that can be sold profitably. It is strongly believed that new products management is a combination of art and science. Art is essentially based on intuition, experience, hunch, or gut feel – when managers lack the experience or information to make a reasoned decision. (Crawford, M and Benedetto, A.D., 2003)

When Jack Welsh, the widely admired CEO of General Electric was in Australia recently, he was widely quoted as saying that the winners in the new economy will be old economy companies who have captured the best and brightest ideas people, and used their skills to transform the traditional bricks and mortar blue-chips into highly creative ideas driven organisations. (http://www.saatchikevin.com)

Innovate or fall behind: The competitive imperative for virtually all businesses today is that simple. Achieving it, however, is difficult because innovation takes place when different ideas, perceptions, and ways of processing and judging information mix. This often requires the collaboration among various players who see the world in inherently different ways.

In order to reap the full benefit of innovation in any institution, we need to give the manpower behind it essential and critical consideration. This study has taken a closer look at the people who make this process a reality to see if there exists a correlation between group personality profiles and perceived innovation output. It is important that organisations bear in mind that creativity is a journey and not a destination.

Innovation is fundamentally a human activity that has been woven by the personalities, emotions and quirks of many people. There is genuine benefit to be derived from the diverse personalities orchestrating as a single entity, yet at the same time not compromising their individualities as people. After all, painting with a palette of colors is a lot more interesting than being restricted to one or a few hues.

1.2 Background of the Research

1.2.1 The Value of Innovation

Management gurus such as Tom Peters, Rosabeth Moss Kanter and Gary Hamel first emphasized the importance of innovation in the 1980's. Today, there is hardly a manager who could dispute the valuable contribution it makes towards an organisations success. This is reflected in the findings of a survey of 100 UK-based best practice companies, conducted by the British Department for Trade and Industry (CBI) in 1995. This showed criteria like quality, reliability and low cost are merely qualifiers: they are the minimum requirements that have to be met. The prime drivers for differentiation and competitive advantage are innovation and customization. (Stamm, B.V., 2003)

Over a hundred billion dollars are spent yearly on the technical phase of the new product development process alone. The real reason for this is that new products hold the key to most organisations biggest problems. Competitors do the most damage when:

1) There is so little product differentiation that price cutting takes everyone's margins away or
2) When they have a desirable new item that any other organisation doesn't

The fact is that a successful new product does more good for an organisation than anything else that can happen. In an article on "How to escape a Price War," Fortune gave product innovation as the primary answer, and who doesn't want to escape a price war? (Andrew E. Serwer, 1994).

IBM Institute for Business Value interviewed over 20 electronics and high-technology manufacturers from around the world. The research showed that companies that manage innovation well enjoy higher revenue growth than those that are less adept managers. (See figure 1)

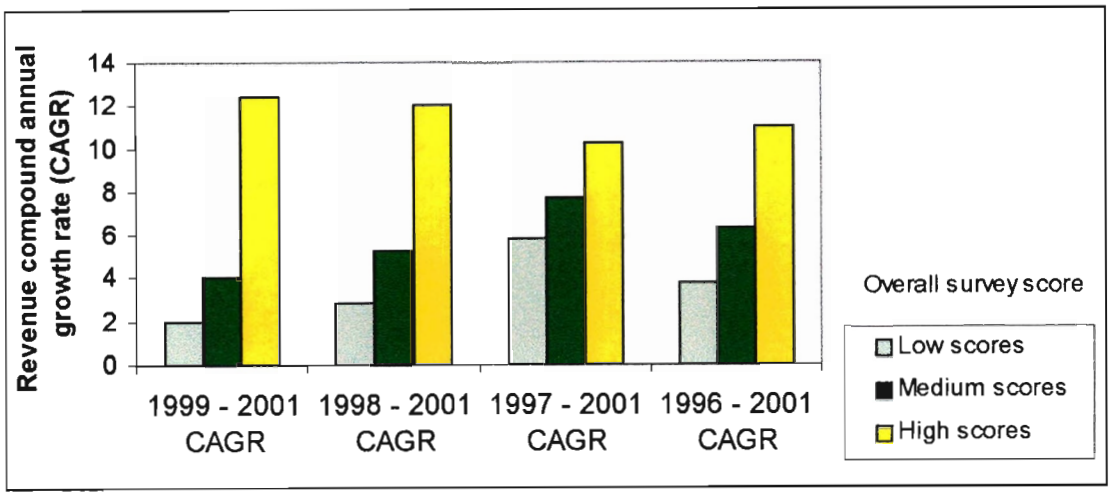

Figure 1: High scorers consistently outperformed medium and low scorers in terms of compound average revenue growth (CAGR)
(Source: IBM Institute for Business Value)

1.2.2 Finding the right people

Organisations known for their innovative product programs are also known for being staffed with highly creative people – those that get ideas with a high degree of usefulness. "Unconventional individuals" – those with diverse experiences, great enthusiasm for innovation, and more foreign experience, for example – are better bets to come up with successful innovations than are "run-of-the-mill" technical personnel. (Steiner, 1995)

Research reports suggest two different types of creative people: those with artistic creativity and those with scientific creativity. But new product creative types need both. Engineers without the touch of the artist and artists without scientific strength are probably less successful in new products ideation. The field of industrial design is so clearly a merger of art and engineering that controversy exists over which school in a university should house it. (Crawford, M and Benedetto, A.D., 2003)

One study of new product development personnel working in the chemical industry found that those with high MBTI (Meyers-Briggs Type Indicator) Creativity Index scores identified

new product opportunities that were 12 or 13 times more profitable than those identified by other personnel. (Stevens, Burley and Divine, 1999). The study also reported increases in speed and productivity of the new products process. This suggests that it would make sense to identify the most creative individuals and to get them involved in the earliest phases of the new products process.

In the new economy, diversity is perceived as an asset, not an obstacle. If any organisation needs their staff to be creative it should cherish their individuality. Homogenising people kills creativity. Companies need to allow people to be different. It is critical for managers to recruit people who are different to them. Organisations who fail to do this become victims of what is commonly called the 'comfortable clone syndrome' where co-workers share similar interests and training and everyone thinks alike. Because all ideas pass through similar cognitive screens, only familiar one's survive. Such a group will struggle to innovate, often in vain. Even when individuals who are different are recruited, it is equally important that the environment is conducive to extracting the value of such individuals as opposed to 'cutting the rough edges' to get them to fit in.

J.P. Guildford, a psychologist coined the phrases 'divergent' and 'convergent' in the early 1950's to describe different thinking styles. Any one person tends to be dominantly either a convergent or divergent thinker. Convergent thinking is the sort of training most of us are trained to do. Divergent thinking is more intuitive thinking. It is useful with problems where there is no one right answer. The two halves of the brain are responsible for these two different ways of thinking. The left half is more a linear, rational, analytical, verbal, deductive and quantitative section of the brain, while the right half is more insightful, intuitive, non-verbal/visual, inductive and qualitative. All people use both halves of their brains to varying degrees. For the innovation process to be successful all the qualities of both halves of the brain are essential.

Dr. Michael Kirton developed the concept of creativity styles in the early 1970's, in his Adaptation/ Innovation theory (Journal of Applied Psychology, 61, 622, 1976). The theory sees a continuum of styles of problem-solving (e.g. creativity), between extremes he labels "adaptive" and "innovative." Kirton says people are naturally oriented toward a point along

the continuum. People who tend to solve problems with adaptive creativity seek to improve the existing system; people who are oriented toward creativity seek to change the system. (Prather, 1994).

Adaptor	**Innovator**
Efficient, thorough, adaptable, methodical, organized, precise, reliable, dependable	Ingenious, original, independent, unconventional
Accepts problem definition	Challenges problem definition
Does things better	Does things differently
Concerned with resolving problems rather than finding them	Discovers problems and avenues for their solutions
Seeks solutions to problems in tried and understood ways	Manipulates problem by questioning existing assumptions
Reduces problems by improvement and greater efficiency, while aiming at continuity and stability	Is catalyst to unsettled groups, irreverent of their consensual views
Seems impervious to boredom, able to maintain high accuracy in long spells of detailed work	Capable of routine work (system maintenance) for only short bursts, quick to delegate routine tasks
Is an authority within established structures	Tends to take control in unstructured situations
How the "other side" often sees extreme adaptors and innovators	
Dogmatic, compliant, stuck in a rut, timid, conforming and inflexible.	Unsound, impractical, abrasive, undisciplined, insensitive and one who loves to create confusion

Table 1. Characteristics of adaptors and innovators
(Source: http://pubs.acs.org/subscribe/journals/ci/31/ill/html/llhipple_box3.ci.html)

1.2.3 The new product development process

Theory spells out that there is a basic process flow that businesses use to innovate. This structure may differ from organisation to organisation or between industries, however there is a fundamental structure for the development of new product or service development. Opportunity identification and selection is the first stage, this is followed by concept generation. Third is concept/ project evaluation and the fourth phase is development. Finally the product or service is launched. Each of these steps is elaborated on in Chapter 2. These steps are normally encompassed in a funnel shaped process diagram that indicates each of these phases as well as the 'gates' between them. The gates serve as decision making pauses in the process.

IBM executives Cooper, Greenberg and Zuk compiled an article entitled "Reshaping the funnel: making innovation more profitable for high-tech manufacturers." The article critiqued the current shape of the innovation funnel commenting that this shape allows a multitude of ideas to enter the funnel but a small fraction of these only make it through to the market as an appreciable offering. The shortcomings of the funnel included that products could not be launched fast enough. With time in market of products declining, high-tech manufacturers have learned that time to market is a critical factor.

It was also criticised that the funnel produced an inadequate yield. Most ideas never see the light at the end of the 'funnel'. According to the Product Development and Management Association (PDMA), it takes 11 ideas to generate just one commercial success. In any type of creative endeavor, one might expect some early fallout as concepts are considered and dismissed – however, the PDMA reports that, of the much smaller subset of ideas that actually enter development, 41 percent never exit the process as a successful product. The PDMA explains the typical mortality rate this way: for every 11 ideas conceived, 3 are allowed to enter development, 1.3 make it to launch and only 1 becomes a success. (Cooper, Greenberg and Zuk, 2003).

The article continued to comment that the current funnel shape wastes valuable resources. According to one study, 46 percent of the product development resources are spent on

products that fail or never make it to the market. (Cooper, 2001). Further, it was criticised that the traditional funnel shape overlooked key market shifts. Particularly in the high-tech industry, the "invent it and they will buy it" cycle has been broken. Faster, better or denser are not necessarily reasons for consumers to purchase. This break in the cycle no longer stimulates such demand.

It is imperative to note that different products and services have different product life cycles and different industries have different focuses on the different phases that constitute the new product development process. The rates at which different industries innovate differ. It was learnt that this is difficult to measure and hence there are no prescribed innovation rates for the different industries. This concept is itself an evolving one.

1.2.4 Speed to market

Today businesses are viciously competing for not only the best market-share but more importantly the mind-share of their target market. Pioneer products capture the mind-space of the market to a greater degree than follower products. Accompanied with the risk of being first in the market, a crowning reward is capturing the mind-share that familiarises the market with this product. This however needs to be protected and defended through further innovation, as it is clearly understood that innovation is a continuous process.

There are several ways of measuring the output of the innovation process. Many institutions use the speed to market of new products as a measure of their innovation.

Many executives seek shortened cycle times not for it's own value but as a means to raise productivity by squeezing more products out of their resources. They fail to accept that faster development requires enhanced staffing levels. Without the enhanced staffing levels, nothing changes, and their developers soon become frustrated by the implied demand to work twice as hard. If the desired objective is actually productivity (more new products per developer) rather than cycle time, then other solutions such as design automation are likely to be more effective than simply trying to optimistically extract twice as much output from the same resources.

1.3 Motivation for the Research

Although many institutions within different industries understand the importance of innovation in their organizations, few understand how to manage the entire process in order the harvest the benefits of the innovation delivery. The matching of human resource for the required task stages in this process is crucial to effective new product development. This study is motivated by the gap that exists in concrete evidence of the personality profiles that are essential for the efficient and meaningful intended value of the innovation delivery process.

Figure 1 also depicts the clear benefit in the form of revenue well adept companies reap owing to meaningful innovation delivery.

1.4 Value of the Project

This research will shed some light on the spread of different personality traits that exist in new product development teams. Three organisations were chosen with different perceived speed to market innovation delivery. A model shall be applied to the different teams measured to assess their spread across the personality variance. This model has primarily been used to evaluate brand personalities as opposed to human personalities. However this study extends the application of this model to that of giving value to personality traits of people.

1.5 Definitions

Debater: This definition forms part of the model designed in Chapter 2. Refer to section 2.3.2.

Diversity: This is not implied to particularly mean cultural, ethnic, gender or racial diversity, but rather personality diversity.

Effecter: This definition forms part of the model designed in Chapter 2. Refer to section 2.3.2.

Mind-share/ mind-space: Leading organisations have learned that in order to win consumer loyalty and ultimately maintain market dominance they need to capture the mindful attention of their consumers. The ideal product should strive to be top-of-mind to the target consumer. A good example is the case of Coca Cola, where even the association of wanting any cool drink evokes a consumer to say that he would like a can of coke. Hence it is the consumers mind-space that effective marketers target.

Motivator: This definition forms part of the model designed in Chapter 2. Refer to section 2.3.2.

New economy: This term is often used to describe firms that have higher shareholder expectations. They exist in environments where there are low barriers to entry, near zero variable costs of operation, and, as a result there is intense and constantly shifting competition. Such firms compete in real time rather than 'cycle time' and operate in constantly responsive dialogue with their customers and their market. The resources of such firms are organized around the demand side rather than the supply side, i.e. customers, markets, trends and needs are actively monitored.

Originator: This definition forms part of the model designed in Chapter 2. Refer to section 2.3.2.

Output: The output here will be taken as the rate at which projects are completed. After careful consideration and discussion with innovation executives it was felt that the number of new products launched is not an effective measure of the output of the innovation process. This is because different industries have different product life cycles. It is not fair to compare the number of product launches of an FMCG company with that of an automobile development company. However comparing whether or not they meet their set targets according to what their respective organisation demands, may perhaps be a better reflection of the output.

Organisations have learned that launching the new market offering at the optimum time is just as essential as the innovation itself. Executives have commented that organisations that do not meet project deadlines often risk a competitor launching it before you, then all the benefit of capturing market-share, mind-share, the confidence of all stakeholders and other pioneering advantages are lost. The organisation will then launch a product after its competitor and that may not be perceived as innovation, but rather as mimicking.

Therefore, the perception of whether or not projects are completed on time will be taken as a measure of the output.

1.6 Problem statement

Intuitively, executives of the new economy know that continuous innovation is the key to corporate growth. Yet, many companies still depend on a fair amount of luck to transform good ideas into successful products and services. A recent study revealed that 84 percent of business leaders of 700 worldwide organisations agreed that innovation is more of a critical success factor than it was five years ago, however only 25 percent of them were pleased with their performance in innovation. (Padrao, 2003).

Creating innovative products in the marketplace requires an extensive process, an uncertain process that is difficult to manage and that few have mastered. Innovation management still consists more of an art than a science and shareholders have little patience with the inconsistent performance of a process that appears to be outside of management control.

A huge gap has been revealed between what leading corporations say and do about innovation. The gap is large: while 80 percent of companies acknowledged the importance of innovation in their business, only 4 percent were confident that they were good at it. (Ceserati and Greatwood, 1995.)
In this study we will examine if there exists a relationship between innovation team structure and perceived output.

1.7 Objectives of the study

In an attempt to add value to the scientific nature of the innovation process, this study explores the people side of this equation. The synergy created by innovation teams is undoubtedly an imperative element of new product development and it is examined in this study.

The objectives of this study are:

- To determine if there is a relationship between a spread of different personality types in new product development teams and perceived output of the process.
- To extend the application of the Heylen Model (which has been slightly modified) to human personalities and hence establish a new model for the evaluation of personality types with direct relevance to the new product development process. Hence the design of a new model.

Main hypothesis (Null hypothesis)

H_o: There exists a relationship between diverse personality innovation teams and the perceived output of the innovation process.

Alternative hypothesis

H_A: There is no relationship between diverse personality innovation teams and perceived output of the process.

Sub hypotheses

H_1: There exists a relationship between originators in a new product development team and the perceived output of the process.
H_2: There exists a relationship between motivators in a new product development team and the perceived output of the process.

H_3: There exists a relationship between debaters in a new product development team and the perceived output of the process.
H_4: There exists a relationship between effecters in a new product development team and the perceived output of the process.

1.8 Limitations of the project

There is a clear geographical limitation to this study: although the literature covered is on a global scale, the work conducted was specific to 3 organisations in the Durban region. There were also resource and time constraints that restricted the study.

All three organisations in this study prefer that they remain un-named, hence ethically the writer will not openly divulge these identities.

1.9 Structure of the study

Chapter 1: This chapter includes the background of the research, motivation of the research, value of the project, definitions, problem statement, objective of the study and limitations of the study.

Chapter 2: This is the chapter entitled 'The development of a model to profile personality types in new product development teams' and it contains the relevant theory.

Chapter 3: This section covers the research methodology of the study, i.e. research method selection, sampling design, data collection, instrument, bias control, reliability and validity.

Chapter 4: This chapter covers data analysis and evaluation.

Chapter 5:Research conclusions and recommendations are presented in this section.

CHAPTER 2

THE DEVELOPMENT OF A MODEL TO PROFILE PERSONALITY TYPES IN NEW PRODUCT DEVELOPMENT TEAMS

2.1 The innovation process

The number one reason for success is a *unique superior product.* This finding ties in studies on the causes of failure – it has been learned that the number one cause of failure is "no need for the product," and number two is " there was a need but the new product did not meet the need." In other words it was not unique or superior. It did not offer the user sufficient value added relative to the costs of purchasing and use. Value added is a key concept to keep in mind as you travel the new products highway.

A recent article from the IBM Institute for Business Value explained that by integrating four key management processes, manufacturing firms could produce innovation:

- With the right fit – Market planning allows manufacturers to conceptualise products that take advantage of market opportunities and appeal to selected market segments.

- At the right pace – Platform management establishes an architectural base that firms can use to deliver new products more quickly and at a lower cost.

- At the right cost – Pipeline management encourages efficient use of people, processes and technology across the product life cycle, lowering the overall cost of innovation by halting bad projects early before they waste valuable resources.

- For sustained returns – Portfolio management optimizes the overall spread of investment, across all new projects and existing products, based on risk, return and degree of strategic alignment, helping to create a steady stream of returns on innovation.

2.1.1 Stages in the process

Theory describes the new product process in the shape of a funnel, as seen below. The process path includes the following phases:

a) **Idea**
b) **Feasibility**
c) **Capability**
d) **Implementation**
e) **Launch**

This is the process of converting an idea to business. It has also been accepted that the monitoring of trends or opportunity spotting precedes the idea stage in the funnel. In contrast with other phases that are sequential in nature, this activity is a continuous process. It basically involves continuously scanning the world in both an analytical and intuitive approach for relevant developments.

During phase one **"Idea"** is about identifying a trend in the marketplace and then prospecting an opportunity to realize the trend. A quick informal market scan could give an indication of the market potential. Desk research and consulting experts can be very useful. The use of "gut feel" is also very helpful here. The basic questions answered here are "which customers really benefit from this idea" "what substitutes are readily available (financial and non financial)" and "what is the size of the market." Based on the market, alternative solutions to fulfill customer needs can be generated. The question "why should we continue with this idea" is also answered here. The objective to convince management that it is a viable idea.

The **"Feasibility"** stage is about evaluating the idea and opportunity. This requires hard data, analysis, market research, a rough study of the operational and IT consequences and sometimes proof of a concept. It provides answers for the following questions: "is the market attractive", "can we do it", and "is it profitable". In this phase the assumptions from the idea phase are checked. The different market mix options are being refined.

The third phase, **"Capability"** is directed at refining the feasibility study, making the final choices and implementation planning. It answers the "how to" question by planning the necessary activities. This is where we confirm and position to capture the opportunity. This phase is also sometimes referred as the "Business Plan." This is because the general planning of product development occurs here. The focus is on refining the marketing mix with a detailed product description, pricing strategy and an internal and external communication plan.

"Implementation" is the phase where the actual realisation of the idea/ product starts. It focuses on elaborating the marketing strategy and implementing the organizational requirements to commercialise the innovation. After the innovation has been developed it is tested or piloted to show that it performs according to expectations. At the end of stage four the decision has to be made whether or not the innovation is ready for introduction to the market place.

The final stage, **"Launch"** or introduction to market is where stock is produced and distributed to customers. The innovation offering is introduced to the market place. The progress of innovation requires close monitoring in this phase to make adaptations whenever necessary.

2.1.2 Gates

At the end of each stage a clear decision needs to be made, or a gate needs to be deliberately passed through, regarding the progress of the innovation to the market place.

The gates can support one of the following decisions:

- Go
- No-go
- Pause

The go and no-go are obvious options. However in some cases the innovation has great potential, but there are no resources available at the time or there are still some crucial uncertainties. An idea may be paused or parked at the end of a phase, but only to be put back on track when either the resources are available or the final questions have been answered. Normally the 'gate-keepers' are senior management. They are responsible for assessing all the work done during a particular phase and for deciding on whether to allow the evolving idea through to a new stage in the funnel for further processing.

2.1.3 Funnel

The funnel shape represents the way the numbers of innovation ideas in play decreases, while the quality of the remaining ideas increases, as they pass through the different phases and decision gates. The phases mentioned above form the phases that constitute the funnel.

Although this funnel indicates the different stages through the process of new product or service development, many industries or even individual organisations modify this framework and adapt this structure to extract the maximum benefit from it relevant to their organisation or industry. This may be attributed to several differences in products, markets, nature of the organisation, life cycles of product/ service, resources, etc.

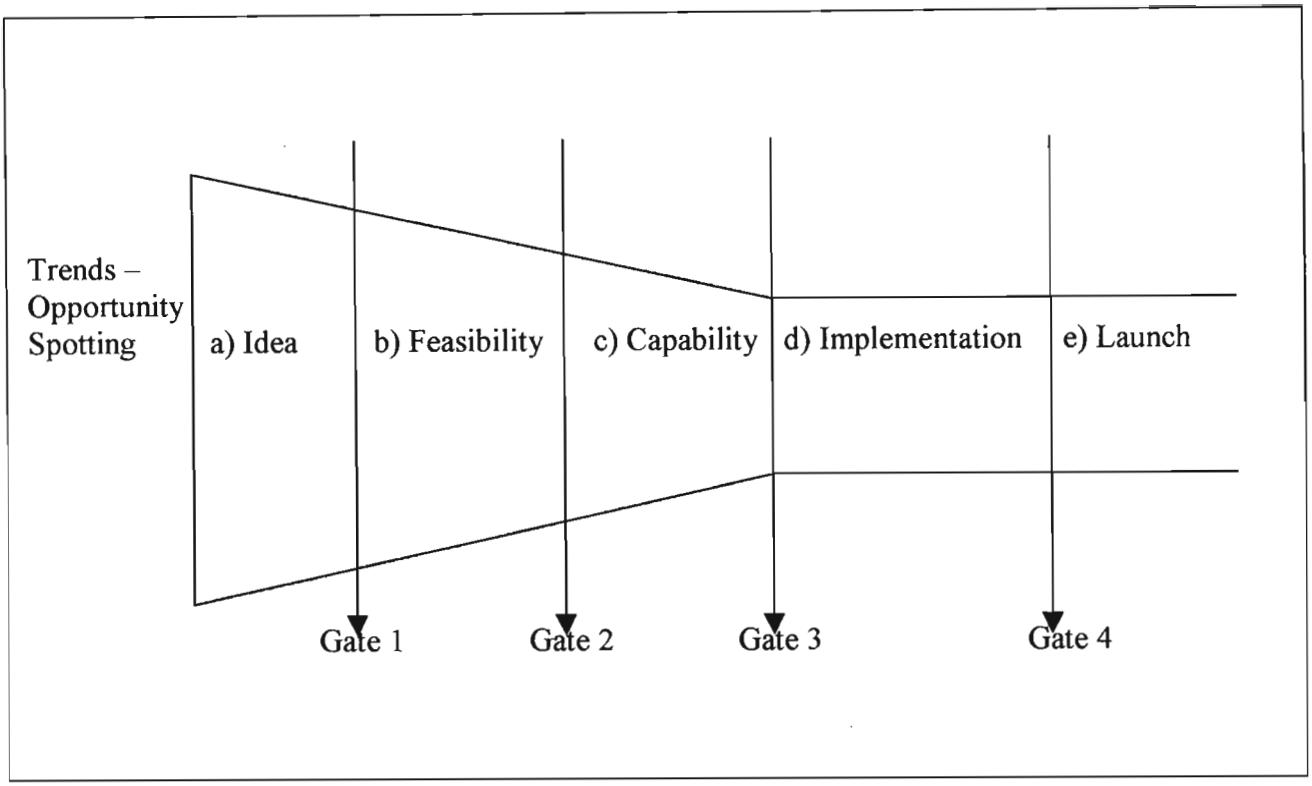

Figure 2: Innovation Funnel depicting stage-gate process
(Source: ING European Innovation Centre, version1, October 2001)

Upon analysis of the above funnel framework the following personality traits are essential for the new product development process to be successful:

A) Idea generator/s required as per (a)
B) Driver/s required as per (b) who checks the feasibility, i.e. they move the idea forward
C) Planner/s required as per (c) to assess the capabilities
D) Developer/s required as per (d) and (e) for implementation and launch
E) A leader/ facilitator is required to facilitate the progression of the project. Such co-ordination is imperative for coherent process flow.

The above process path is prescriptive in the nature of profile of personality that is required during each phase through the funnel. The requirements of each phase are distinct and clear.

Innovation teams are familiar with the above process flow, yet still their output can be optimized. This is to be tested by profiling the team members as per their personality and the required traits for efficient teamwork. The innovation process prescribes the personality types essential for effective and efficient output from this process and inevitably to growth.

2.2 Matching of resource with process needs

Throughout time, much controversy has surrounded the use of tools to measure different attributes of people with the psychoanalytical tools designed to measure these different variables of people. The fear of merely grouping people for the sake of a clearer understanding is a dangerous option especially when we consider that people are affected by so many varying factors including culture, childhood, nature of their social environment, peers, the list is quite extensive. For example: Interviewers are trained to assess an individual's assertiveness/ boldness by level of eye contact made by the interviewee. Avoidance of eye contact may even be interpreted as a lack of sincerity. However, this may in fact be completely inaccurate in certain cultures where direct eye contact is perceived as disrespectful and has no bearing the individual's boldness or sincerity. Therefore it is extremely important to guard against inferring conclusions that lack clarity and depth to the area we seek to understand.

Bearing this in mind, researchers strive to make measurement of variables clear by clearly stating definitions of variables and any shortfalls in the definition for research purposes. Hence we must be cautious when we are attempting to match multidimensional human beings to one or two dimensional measurement or analysis.

2.2.1 The Freudian Dimension of Personality

During the century and a half leading up to the Millennium there have been significant shifts in our understanding of the psychology of human personality. Sigmund Freud started the psychoanalytical school of thinking with his discovery – the subconscious mind. Freud was interested in understanding the total human personality and its interaction with the social

world. The two extremes of personality types of the *expressive* and *repressive* behaviours were defined here:

EXPRESSIVE: Hedonistic
Need for sensory gratification
New concepts of thought

REPRESSIVE: Need for functionality
Alleviation of anxiety
Practical and purposeful

Freud explained that the vital life energy arises from the subconscious. The subconscious is instinctual and pleasure seeking in nature and this urge for pleasure is regulated by what he termed the super ego, which is our conscience exercising moral control over the ego driven by guilt and moral anxiety. The ego develops many defense mechanisms to protect itself from such anxiety and guilt stemming from hedonistic drives. Repression is one such mechanism.

The 'expressives' are people who seek certain things in their lives and who find ways to attain these things. They enjoy trying new things that could potentially lead them in the direction of attaining their desired goal. They have the ability to think conceptually. Edward de Bono, the father of lateral thinking clearly expresses that it is natural that we think in a certain pattern because our thought processes are being molded all our lives.

According to Edward de Bono, whose education ranges computing with medicine and psychology, the human brain makes sense of the world by building up patterns based on experience. These patterns allow us to see the world in a particular way, and in doing so; we reinforce the patterns – like falling rainwater collected in contours set by previous downpours. Such patterns representing experience are indispensable for everyday existence; for example how could people get dressed every day in the morning if they did not already

know from their experience in what order to put their clothes on? (http://www.edwdebono.com/debono/berry.htm)

However the inevitable drawback is that unless you learn to escape the obvious way of looking at things, you will not develop new ideas. De Bono also uses the example of an instance where the users of elevators in a tall building complained that the elevators were too slow. The building owners considered several options to deal with this complaint, including building more elevators, engineering new ones to make them faster, etc. The problem perception was realized as the elevator. However somebody suggested looking at the situation a little differently and suggested considering a way to make the people happy without changing the elevators. It was suggested that two huge mirrors be put up on either side of the elevator. Now, people waiting for the elevators were more occupied with their physical appearance in the mirrors that no one even realized how long the elevator took to move from floor to floor. No repeat complaints were received from any of the tenants.

We learn to address issues in certain ways, and this 'training' starts from the time we are born. He explains that 5 – 6 year olds are at the most creative age, since even school teaches you to think in a certain fashion, to tackle problems in a certain sequence, to perceive things around you in a particular manner. School teaches us to conform or to abide by the rules. Whilst this may appear necessary, it comes at the opportunity cost of stripping creativity and originality from people.

This ability to think 'out of the box' is dominant in expressive and hedonistic individuals. Their interpretation and perception to stimuli differs from people who are more adoptive in nature. This theory is in line with the left and right brain dominant nature of individuals discussed earlier.

The repressive traits are associated with the desire to do good or with the need for functionality. Such personalities restrain their desire for sensory gratification intending to conform socially or otherwise to their environment. Freud explained how the conscience of the repressive dominant personality is affected to a greater degree than the hedonistic or

pleasure seeking dominant personality, since they put greater restraint on their impulsive or instinctual drives.

Freud's contribution to our knowledge on the workings of the human mind has facilitated the development of many models on human thought.

2.2.2 The Adlerian Dimension of Personality

"We cannot comprehend the workings of the (individual) human psyche without at the same time understanding social relationships. Person-to-person relationships are governed by human institutions such as political traditions in the community. The psyche cannot act as an independent agent," (Adler 1927).

The second dimension of personality was discovered to range on an axis that had extremes ranging from the need for a social feeling to the striving for personal power and superiority.

ASSERTIVENESS:	Individualistic
	Domination
	Assertive
CONFORMISM:	Social feeling
	Caring and sharing
	Submissive

People's behaviour was classified on the span of this axis, in an attempt to measure to what degree their behaviour was driven by a need to feel as though you belonged or to what extent they were prepared to discard this social expectation and behave according to their own personal and individual drive.

In this paper, an attempt is made to correlate human thought and behaviour to identify if a fit between personality and job function in innovation teams exists. The focus here is on new

product or service development, hence the element of creativity is also an essential factor to consider here.

2.2.3 The Two Dimensions of Brand Personality

Figure 3 is a representation of the two dimensions of brand personality. These dimensions are basically the combination of the two human personality dimensions discussed by Freud and Adler. The Heylen Model is very similar to this model and has proven to be an exceptional tool when assessing brand personality.

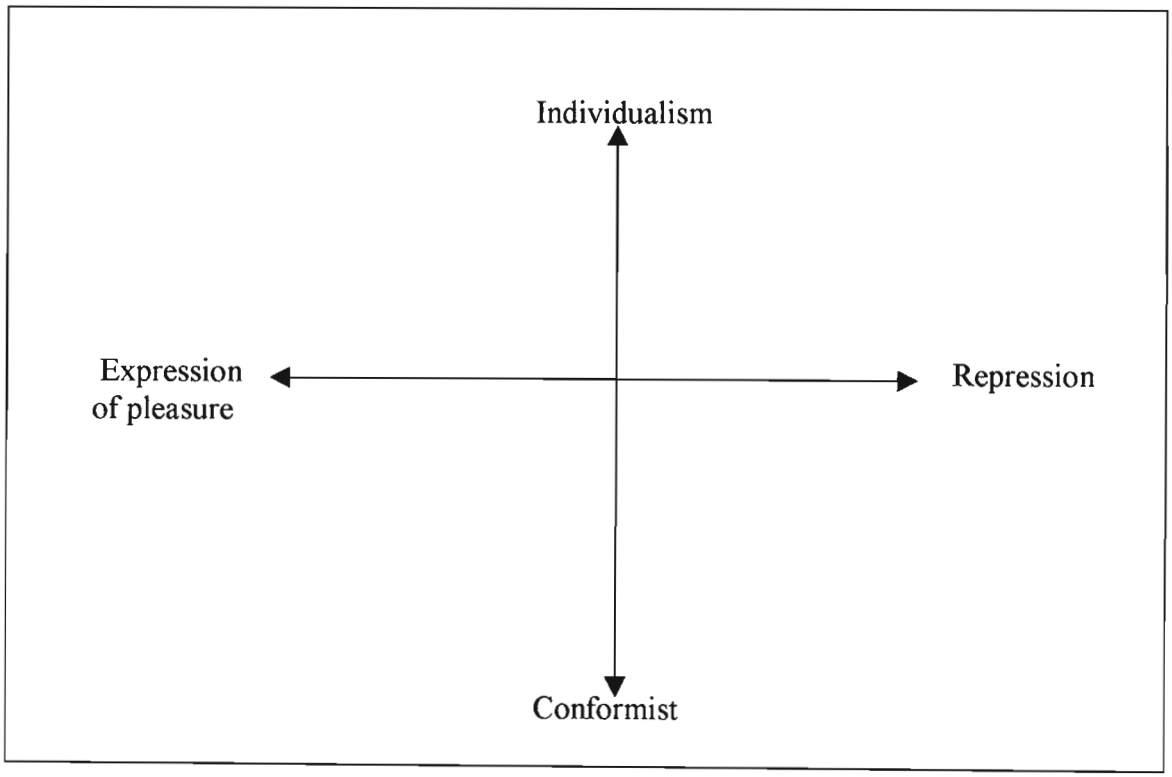

Figure 3: The fundamental axes of brand personality

A careful analysis of the personality types from 2.1.3 previously discussed, i.e. the idea generator, driver, etc. shows that the individuals required could be plotted against axes that explore their thought and behaviour patterns. The Heylen Model has been widely used to evaluate brand personalities. In the Heylen model the expression/repression axis is a biogenetic drive axis. Expression is outer directed whilst repression is inner directed. The

individualism/ conformist axis is a 'nurture axis,' which is more affected by biological and environmental factors. This is also known as the me/ us axis where 'me' focuses on individualism and 'us' has more of a group focus. For the derivation of the new model, the biogenetic drive will be a facet of human attribute that is more the inner working of people, their thought. We cannot physically see peoples thought. The individualist and the group axis is more of a behavioural axis, i.e. people behave independently or as part of a group/ niche/ elite, which stems from a sense of belonging. The two extremes from the brand axes will be used in the model for assessing people. This will be the basis of the tool that will be used to profile the individuals in innovation teams.

From the literature on the Freudian and Adlerian dimensions, the 4 different ends of the axes have been described. Edward de Bono also contributed to defining the creative personality and the conformist in us all. From these definitions it is logical to place the idea generator in the quadrant with individualism and expression of pleasure axes, as literature also describes creative people as having these traits.

The second phase in the funnel (feasibility) needs an enthusiast who starts personifying the idea with great zest. This personality is a bridge between the idea generator and the rest of the process; therefore they have the individualist axis in common. That is their common ground. However this personality has the ability to translate it meaningfully to the rest of the group, this person puts great effort into substantiating the idea. Therefore it is sensical that this personality sits in between the individualist and the repressive axes, since it forms this bridge.

The third personality type as per the funnel is the capability assessor required for his/ her refining abilities. This personality needs to pay great attention to detail to ascertain this status. These traits are further discussed later in 2.3.2 as the debater personality. The fourth quadrant is explained by the implementing personality, the individual who is in between the inner directed (repression) and conformist/ group axes. This personality is also further discussed later. This personality is both repressive and has a desire to feel as though he/ she belongs. Therefore these individuals are very good at executing tasks given to them.

Despite the formation of innovation teams, the criteria for the selection of individual team members to be effective for the desired purpose, is not clear. Being able to trust team members, share information and good communication are criteria for *any* effective team, be it a baseball team or a Boy Scout team. What are the specific criteria for a *new product development team* to function purposefully?

2.3 PROPOSED MODEL

2.3.1 The MODEL model

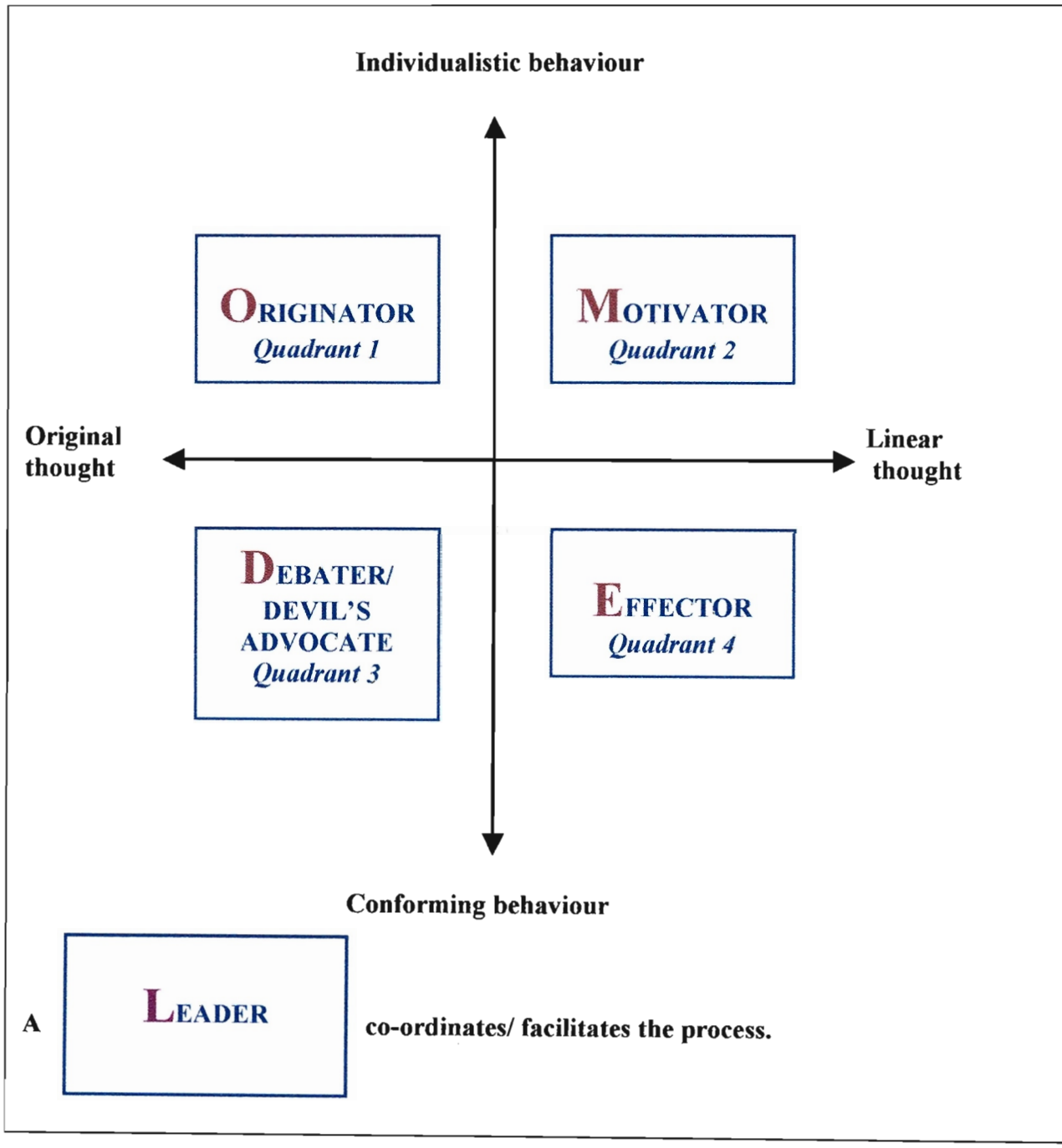

Figure 4: Proposed model for assessing personality types (MODEL)

From theory, personalities of people are commonly measured using attitudes, thinking styles, behaviour and perception/ cognition. These are the more popular methods used when evaluating an aspect of human personality.

The above is a model using behaviour and thinking styles as the two fundamental axes to measure personality types for the purpose of determining their dominant traits. These traits contribute to the innovation process and this model points out that there exists value in the co-existence of diverse personality types in a new product development environment.

These two axes intersect dividing these two phenomena into four different extreme personality characteristics. Quadrant 1 is where the two extremes of original thought and individualistic behaviour overlap to classify the dominant personality type of the creative person. Quadrant 2 is where the extremes of individualistic behaviour and linear or sequential thought overlap to create the profile of the driving type of personality. This personality has the ability to act individualistically yet thinks in a more structured fashion than the pure creative personality.

Quadrant 3 encapsulates the original thinker and the conforming behaviour characteristics of individuals. This personality is also very creative in his or her thought however his/ her behaviour is conforming or adaptive. They too form an important bridge between a creative idea and the actual materialisation of this idea in the real world. They creatively oppose and question the originators ideas to ascertain validity of the potential market offering. This is aligned with the refining qualities of the feasibility phase of the innovation funnel.

The fourth quadrant is an overlap of the linear thinker and the conforming behaviour individual. This quadrant is representative of the personality that enjoys implementation. All of the above traits are critical to the success of the new product development process.

2.3.2 New Product Development Teams

It is proposed that new product development teams are made up of these 5 basic personalities, 4 of which form part of the proposed model.

A) Originator (Idea Generator)

These are normally the creative personality types who defy the rules. If structure exists, the creative personality type will break this structure. This personality type will be referred to as the **Originator**. They are not comfortable with rigidity and they are excited by the ability to create. Owing to their reluctance to conform to structure they are able to produce original ideas as their perception to any stimuli differs to that of any other personality type. Analogical thinking is central to creativity. The creative person 'makes connections' between one situation and another, between the problem at hand and similar situations. (http://www.winstonbrill.com/bril001/html/article_index/articles/1-50/article34_body.html)

Creativity is not just a collection of intellectual abilities. It is also a personality type, a way of thinking and living. Although creative people tend to be unconventional, they share common traits. For example, creative thinkers are confident, independent and risk-taking individuals. They are perceptive and have good intuition. They display flexible, original thinking. They dare to differ, make waves, challenge traditions and bend a few rules. (http://www.winstonbrill.com)

Originators enjoy praise and acknowledgement for a job well done. They also enjoy being in the spotlight. Such individuals have the ability to think outside 'normal' patterns or structure of thought. This concept has already been explained as the individualist (the Expressive as per Freudian theory). The weakness of having such personality types in new products development process is that they easily lose focus of the bigger picture and being the creative person that he/she is, he/she may generate idea upon idea without clear alignment to the goal.

Other negative traits of creative people include stubbornness, unwillingness to co-operate and indifference to conventions or basic courtesies. They can also be careless and disorganized, particularly with matters they may feel is trivial. Absentmindedness and forgetfulness are also common traits of this personality (http://www.winstonbrill.com). However this personality trait is essential to the innovative process. This initiates the new product development process.

This personality is measured in quadrant 1 in the proposed model. The left hand side of the x or horizontal axis is the axis for original or conceptual thought. The top vertical or y-axis measures individualistic behaviour of the individual. These two areas of the axes encapsulate the measurement of the originator or the creative personality. Personalities plotted that are dominantly existent in this quadrant are the originators (quadrant 1).

B) Motivator (Driver)

Such individuals charge forward with great enthusiasm and take the idea to the next step in the process. Once presented with the idea this person instantly finds ways to implement the idea to completion. This driving personality injects energy to the idea and boosts the idea forward by removing all obstacles that may inhibit progress of the materialisation of this concept. This personality will be called the **Motivator** owing to the value that it adds to the development process. This personality meets the requirements of the capabilities phase in the innovation funnel.

The Motivator supports the Originator and he/ she is eager and persistent. The weakness however of such an individual is that the Motivator will persevere with ideas irrespective of any flaws or missing links in the idea at this early stage. The shortfalls of the idea have not yet been identified. However this individual gives flow to the intention of the new project.

If only the Originator and the Motivator were developing the new product they would work in isolation of other critical areas essential for a meaningful innovation. They could potentially launch a product that lacks practicality in the target market and in essence is

an incomplete offering to the market. The traits of the Motivator are those that are inherent in the quadrant of individualistic behaviour and linear thought (quadrant 2).

C) Debater/ Devil's advocate (Planner)

This personality is required for the feasibility phase and this critical assessment is crucial to ensure that the market offering is a practical and feasible one. The planner is the individual that challenges the idea/ concept. This personality will be referred to as the **Debater/ Devil's Advocate**. The Debater asks all the whys or why nots to ensure that the concept was well thought through. This exercise adds a new dimension to the concept and builds a solid foundation. The Debater thoroughly enjoys the mental exercise of debating and questioning. He/ she may create an equally valid concept but opposite to that of the Originator. This personality is also very creative in thought since a critical axis for this personality type is conceptual or original thought.

The Debater pays great attention to detail. However if he/ she dominates the group then the project may come to a grinding halt or he/she may possibly lead the group in the opposite direction with his/ her own idea.

The Debater personality is found in the third quadrant where conceptual thinking style and adaptive behaviour quadrant overlap. This 'fine tooth comb' personality adds its own unique value to the innovation process and is essential to providing a valuable new market offering.

D) Effecter (Developer)

From the innovation funnel it is evident that this personality will be involved in the implementation phase. The developer is the implementer of the team. This individual will be referred to as the **Effecter.** The Effecter is actively involved at this stage using his/ her strength: crisp execution. Such an individual is excited by contributing to the finishing stages of the process. This person acts by removing any hindrances to materialisation of the new product or service.

The detail of implementation and energetic pursuit is a valuable contribution to the product development process. Any implementational shortcomings can be picked up at this stage. A potential weakness is that the Effecter can lose sight of the concept and pursue other directions if he/she is not frequently directed.

The Effecter is dominant in the fourth quadrant where sequential thinking style and conforming behaviour overlap. This individual has well structured thinking styles and the behaviour of such a person is well aligned, i.e. such an individual easily acts adaptively.

E) Leader

A facilitator is required to co-ordinate all of the above functions. He/she is responsible for weaving the common thread throughout this process and hence facilitates the process flow. The **Leader** assists the team to work smoothly and productively.

Such an individual should be able to identify the value that each of the above personalities has to offer and facilitate the coherence of the entire process. Also, this person should be able to manage any conflict that may arise between any of the above-mentioned personality types constructively. Ultimately any team is as strong as its weakest link and teams need to function effectively for desired results.

Using the initial letters of each of the personalities, the model constructed is:

Motivator
Originator
Debater
Effecter
Leader

2.4 Group Synergy

Synergy has been often described using the equation 1 + 1 = 3. This is precisely what effective teamwork generates. Teams work together toward a goal that any of the members

individually could not achieve economically, and there is an added dimension of value that this combination provides.

A creative team is one in which all the members can collaborate effectively to develop superior solutions to the problems they undertake. Each member can contribute ideas and energy to the goal of solving the problems. Ineffective teams waste time, resources and energy and their solutions are often mediocre or ineffective. Creative teams achieve effective solutions, and they do it with a smaller investment of time, energy and resources. (Albrecht and Albrecht, 1987)

Collaboration involves working together in a special way. By communicating clearly, using option thinking and getting access to all the needed information, a group can work together as a powerful unit to solve a wide variety of problems. One of the keys to a team's creative success is how effectively its members manage their own interaction processes instead of becoming pre-occupied about the 'content,' that is the subject at hand or the problem they are dealing with. In order to function well as a group, the members must develop some ground rules that will help them work together. These rules include things like agreeing on roles, learning to disagree without fighting, learning to process information as a unit, focusing their energies on specific outcomes, and committing themselves to concrete plans. (Albrecht and Albrecht, 1987).

2.5 Benefits of diversity in team structure

Multicultural organisations are defined as organisations that value human differences as competitive advantage, have pluralistic culture that reflects the interest, contributions and values of members of diverse groups, - have full and influential participation by all members of the organisation in decisions and policies that shape the organisation and eliminate discrimination throughout the organisation. (http://www.reeusda.gov/diversity/benefits.htm)

A survey conducted by Hagberg Consulting Group in California, found that companies with diverse workforce tend to be innovative and creative. According to the survey, diverse teams

also proved to be more productive. Several organisations have benefited from valuing diversity in terms of enhanced teamwork, innovation, motivation and profitability.

Also, according to an Australian Centre for International Business report, diverse teams achieve higher levels of technological and organisational efficiency than homogenous work groups and organizational flexibility therefore increases. (Capturing The Diversity Dividend, 2001)

The several benefits of diverse teams include:

- Bigger and better recruitment pool
- Improved productivity
- Increased staff loyalty, morale and job satisfaction
- Great customer satisfaction and sales
- Access to wider markets
- Increased staff retention
- Improved public relations
- Making the business more attractive to investors

2.6 Four major creativity mistakes

1. *The problem may be incorrectly defined.* If any problem lacks complete definition, it is understandable that focus is given to the wrong areas.
2. Convergent thinking, as explained in 1.2.2 previously, cause people to *judge ideas too quickly* because they do not readily accept ideas that differ to their mindset.
3. Because people are often under pressure to solve problems as soon as possible, they *stop at the first good idea.* They do not bear in mind that the first good idea was the easiest to think up but this does not necessarily mean that this is the best idea.
4. *A lack of support* also threatens the implementation of a new idea.

2.7 Practical considerations

Tying up the people, the phases, the roles and the outcomes is not as clear-cut as the theory prescribes it to be. There are several types of innovations, in different phases, by different people, all over the organisation at any given time. Innovation extends beyond the product or service offering to the market to improving organizational processes and capabilities, for e.g. work procedures or ways of communication. In an environment/organisation conducive to innovation many people are even finding better ways to do their jobs.

People are sharing their ideas, putting their ideas together with the ideas of others, improving on half-baked ideas, getting certain ideas into specific form so they can propose them for management consideration, getting to work on large or small projects that are necessary to realise the benefits of the new ideas, and even putting the finishing touches on solutions that have advanced through all the stages of innovation.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

The major purpose of this study is to test a model designed to measure personality types in new product development teams. It has been clearly established that different personality types are critical for the success of innovation. Using this model we wish to learn about the distribution of the personality types in new product development teams. Additional information regarding the age, time in the new product department, functional department, etc have been also established to further describe the respondents and to scan for any striking possible relationships.

3.2 Research method selection

This study is a formal one and is descriptive in nature. Descriptive statistics will be used to verify results obtained. This includes measure of central tendency (mean), dispersion (standard deviation), frequency and ratio analysis. This is a cross sectional study. New associations among different variables will be observed and described. Pearson's correlation coefficient will also be calculated to check for relationships. The SAS software package will be used.

Three different companies from three different industries were selected. One is an FMCG (fast moving consumer goods) company, the second is a chemical manufacturing company and the third is an automotive development company. All three companies are based in the Durban region.

3.3 Sampling design

Non-probability sampling was used. Owing to resource constraints the sample taken was purposive judgment samples were taken. Also the nature of the study required people directly involved in the new product development process.

Thirty people were sampled from the FMCG Company. Twenty people each were sampled from the automotive development company and the chemical manufacturing company. These

samples constituted people from the Marketing, Research and Development (R&D), Finance and Supply chain who are involved in the innovation process.

There are no appropriate statistical techniques for measuring the random sampling error of a non-probability sample. Therefore projecting this data or inferring this data beyond the chosen sample is statistically inappropriate.

3.4 Data Collection

Primary data was collected for this study.

A questionnaire was designed and this was administered to all three companies. The automotive company found it most convenient to respond electronically; hence they were sent and retrieved via e-mail. The chemical manufacturing company as well as the FMCG company were administered with hard copies of the questionnaires and these were physically collected. All questionnaires were retrieved with the help of facilitators within the organisations.

3.5 Instrument

A questionnaire was designed to measure the different characteristics that are to be described in this study. It was designed with the assistance of the study supervisor and in direct conjunction with the model described in Chapter 2.

Three types of data were collected using the instrument:

1) Nominal
2) Ordinal
3) Ratio

3.5.1 Structure of the instrument

Appendix 1 has a copy of the questionnaire that was administered. A 17 question questionnaire was designed and administered to predominantly assess the different personality profiles of the respondents as well as an indication of whether projects were generally finished on time. Additional questions were included to scan for any distinct trends that may exist.

Three types of questions were covered in this instrument:

- Administrative questions
- Classification questions
- Target questions.

The first 3 questions ask for the respondent's age, length of time in company and length of time in new product/project development. This is ratio data. These questions are administrative questions, which identify the respondent and the conditions.

The next question pertains to the respondents current functional department, e.g. marketing or R&D. This is nominal data. This is followed by choices on the highest level of education. The data here is classified as ordinal, which is followed by the collection of nominal data, i.e. management status. Either a yes or no was required for the response. Questions 4, 5 and 6 are classification questions that were designed with the intent to monitor any trends.

The seventh question required that the respondent choose his or her feeling on the general perception of whether or not projects were completed on time. There were 5 options available for the respondent to pick from. This ordinal data collected from this Likert scale was used as an indication of the rate of output of the innovation process. This is a target question since the perception of innovation output is being measured here.

Example:

Projects are finished on time:

Rarely	Some of the time	Most of the time	All of the time	Ahead of time

The following section (questions 8 – 17) contained 10 groups of characteristics of individuals that had four options each. These are clearly target questions used to ascertain the personality profile of each of the respondents. Each of the groups requires for the respondent to rank them in order of preference. The option that is most important to the respondent should get 4 points, the one that is second to most important should get 3 points, the third should get 2 points and the least important option should get 1 point. This is ordinal data and it is used to establish the dominant personality traits of the respondents.

As per the model in Chapter 2, personalities were evaluated on two axes of human measurement: THOUGHT and BEHAVIOUR. These two axes measured extremes human personality on either ends. Thought ranged from conceptual/ changing thought to linear/ sequential thought. The other axis of the model, behaviour, ranged from individualistic/ hedonistic behaviour to conforming or adaptive behaviour. A forced ranking scale is used to collect this data.

Example:

____1_____ I prefer to focus on what I can prove is true

____4_____ I prefer to focus on the future

____3_____ I enjoy seeing things fit together

____2_____ I follow what I feel

The above characteristics ranging the extreme human behaviour and thought were learned from existing theory.

3.5.2 User friendliness

The questionnaire was designed to be completed in approximately 5 minutes. This was taken into consideration during the design of the questionnaire. It was felt that a short precise questionnaire would have a greater return rate that a longer one. Sufficient information was extracted to describe the desired areas of interest. Special care was taken to ensure that questions or options were not double barreled. The vocabulary used was simple and ambiguity was guarded against. All respondents were thanked for their time.

To eliminate confusion when answering questions, most questions had options to choose from. The respondents were assured that their responses would be confidential and were also notified that if they requested feedback on their personality status, it would be gladly reported to them on request.

3.6 Bias control

All questionnaires were completed within the work environment and all responses were returned. Owing to the fact that the sample was relatively small, all the questionnaires were retrieved with the help of facilitators within the organisations. The FMCG company was larger in comparison to the other 2 companies, hence a larger sample was taken.

3.7 Reliability

This questionnaire has not been rated with other questionnaires to test its reliability as it was designed to test the proposed model in this study. However this model is based on the Heylen Model for assessing brand personalities, which has proven to be an excellent tool. The characteristics of the 4 personality types were derived from the existing theory on this model, the psychoanalytical theory of the inner workings of the human mind and behaviour.

3.8 Validity

Since validity refers the extent to which a test measures what we actually wish to measure, the manner in which the questionnaire was drawn up will be reviewed. From the theory of several works, the traits of the different personalities were tabulated. A single trait of each of the four personality traits was clustered to form a single evaluating option.

Hence a trait resembling each of the extreme traits was represented in each ranking option; and the forced ranking scale prioritised the traits, which facilitated the measuring of the personality profiles. However, since this scale was used it only gives us an indication of what the dominant personality type is, but does not give any indication of the extent to which a personality is classified.

Below are the lists of the characteristics of the 2 established extremes of human behaviour and thought.

a) Traits of conceptual thinkers

1. I like discussing new ways to implement things
2. I prefer to focus on the future
3. I like challenging the status quo
4. I enjoy developing my own theories/ philosophies
5. I have an eye for identifying alternatives
6. I am good at getting to the root cause of an issue
7. I enjoy analysing things
8. I find it exciting discussing concepts
9. It is sometimes good to unlearn the things we have learnt to help us move forward
10. I enjoy going down new paths

b) Traits of linear thinkers

1. I enjoy examining detail
2. I prefer to focus on what I can prove is true
3. Others describe my thought as a-b-c-d
4. I prefer taking things a step at a time
5. I think things over carefully before making a decision
6. I like balance and symmetry
7. I enjoy being methodical
8. I am comfortable in a place where there is order
9. I am a firm believer of creating order
10. I have a set pattern for problem solving/ troubleshooting

c) Traits of Individualistic behaviour

1. Routine bores me
2. I follow what I feel
3. I often focus on a number of things at one time
4. Others say that my behaviour isn't always logical
5. I like being in the spotlight
6. I am sometimes hasty/ impulsive
7. I like to have respect
8. Being flexible to change is more important than following a framework
9. Following tradition is not high priority to me
10. I enjoy setting my own set of rules to follow

c) Traits of conforming behaviour

1. Before taking a decision, I like to know the consequence
2. I enjoy seeing things fit together
3. I am uneasy when things are changing
4. Before implementing something new, I like testing it in a small scale

5. I am a firm believer in following the rules
6. I tend to be very careful when trying out a new way to do things
7. I prefer to use methods that are tried and tested
8. I am initially reluctant to try out new ideas
9. I like to fit in with other people
10. I am eager and enthusiastic to work with ideas given to me

CHAPTER 4
DATA ANALYSIS

4.1 Introduction

This study introduces a model that was derived from two fundamental axes, human thought and behaviour. The study will test the designed model to assess if there is any pattern in the spread of personalities in innovation teams and it will establish if this correlates to perceived innovation output.

The first 3 questions identify the respondents, whilst questions 4 – 6 give further detail/ classify them, question 7 measures the perceived output of the process and questions 8 – 17 give an indication of the personality profile of the individuals. Each of the evaluations will be divided into 3 sections:

1) The chemical manufacturer
2) The automobile development company
3) The FMCG company

4.2 Analysis

4.2.1 Chemical Manufacturer

Question 1 classified the ages of each respondent. In this team, ages ranged from 22 – 54 years. Twelve members of the sample were between the ages of 20 – 35, 6 people were in the 36 – 45 age division and 2 respondents were in the 46 – 55 age group. Hence we can conclude that 60% of the sample is between 20 – 35, 30% is in the category 36 – 45, and 10% fall into the 46 – 55 group.

In question 2 we ascertain the number of years that the respondent was employed by the company. This ranged from 2 years to 12 years. Twelve people worked in the organisation for less than 5 years, whereas 8 individuals worked here for 5 or more years, i.e. 60% of the sample worked at this organisation for less than 5 years, whilst the remaining 40% worked here for five years or more.

From question 3 we determined the length of time that each respondent has worked in the new product development division. It was learned that 15 or 75% of the sample were in new product development for less than 5 years, whereas 5 or 25% were involved in new product development for 5 or more years.

The next question determined the number of respondents from each of the 4 functional departments (Marketing, R&D, Finance and Supply Chain). Six individuals were from R&D (30%), 4 were represented from marketing (20%), 4 were selected from finance (20%) and 6 respondents were from the supply chain function (30%).

Question 5 pertained to the highest level of education of each respondent. This section was divided into matric, post matric, graduate or postgraduate categories. Six respondents (30%) had post matric qualifications, 5 (25%) had graduate levels of education and 9 (45%) had postgraduate qualifications.

The management status was ascertained in question 6. This sample had 4 individuals (20%) in management whilst the other 16 (80%) were not managers.

Fourteen individuals (70%) responded in question 7 that they believed that projects were completed on time most of the time. Five respondents (25%) responded they were done on time some of the time, whilst 1 respondent (5%) felt that projects were completed on time all of the time.

For questions 8 – 17, the data analysis was designed mathematically on a Cartesian plane. Each option had a coded trait that was a combination of:

- Conceptual thought
- Linear thought
- Individualistic behaviour
- Conforming/ adaptive behaviour

For example:

_____ I prefer to focus on what I can prove is true (linear thought)

_____ I prefer to focus on the future (conceptual thinker)

_____ I enjoy seeing things fit together (conforming behaviour)

_____ I follow what I feel (individualistic behaviour)

As previously explained, the overlap of the 2 axes on any one quadrant is used to classify the different personality types. Therefore the score for each of the traits i.e. conceptual thinker, linear thinker, etc, are summed to give a total that reflects the respondents rating on both dimensions of thought and behaviour.
For example:

Trait	**Points**	**Axis**
Conceptual thought	36	Negative x-axis
Linear thought	25	Positive x-axis
Individualistic behaviour	16	Positive y-axis
Conforming behaviour	23	Negative y-axis
Total	100	

Table 2: Table reflecting composite points for the four extreme traits.

The sum of all the points for each trait is 100 for each respondent because there are 10 questions. These points are intercepts on each of the axes. These co-ordinates form the shape of the personality profile for the respondents. Each respondent has a quadrilateral shaped personality as per figure 5.

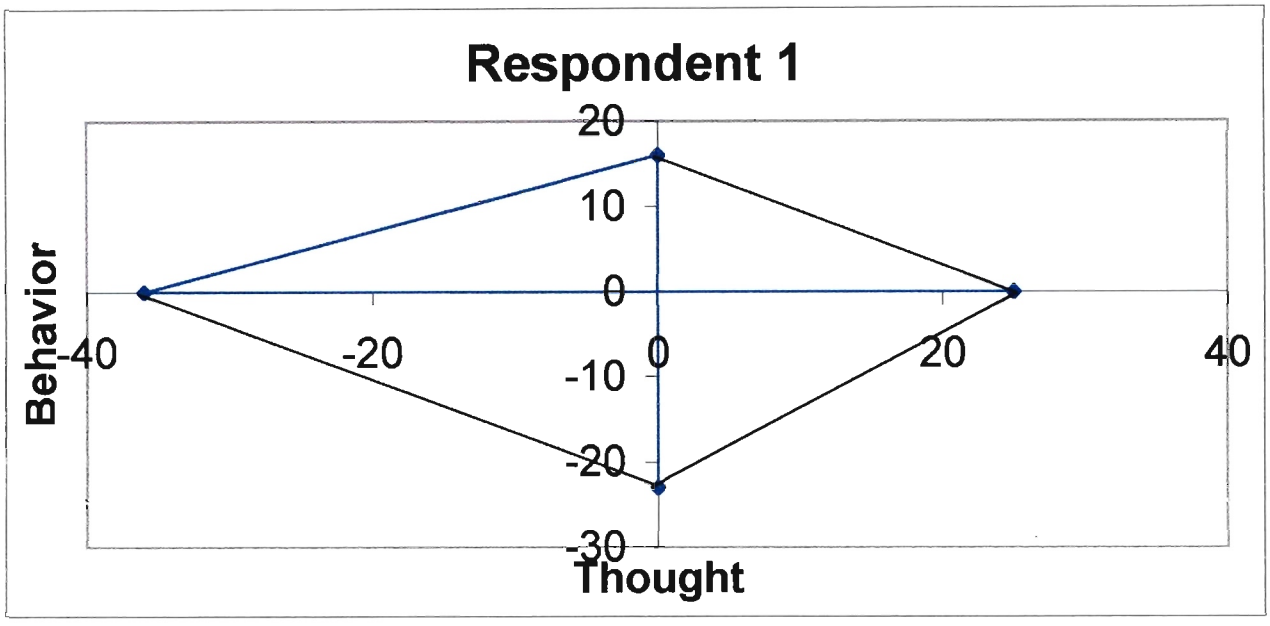

Figure 5: The typical graph of a personality profile

Each quadrant in this graph represents a different personality type; hence by calculating the area of the quadrilateral in each quadrant, we are able to quantify the different personality types. The area of each triangle was computed and these scores were tabulated to assess the dominant personality type of each respondent. Although each respondent has all four qualities to varying degrees, the quality that is represented by the greatest area has been selected as the dominant personality type. Refer to appendices 2 and 3 for the tabulated data on this company.

The distribution of the personalities reflects that there are more originators and debaters in this sample (32.5%), whilst 20% of the sample are effecters and 15% are motivators. Refer to appendix 4 for the pie chart reflecting the graphical spread of this data.

4.2.2 The automobile development company

The results of question 1 reflected that 18 respondents (90%) were between the ages of 20 – 35 and 2 (10%) were between 36 and 45. Question 2 revealed 3 employees (15%)

in this sample were worked in the company for less than five years. The rest of the sample 17 (85%) worked in the company for 5 years or more.

From question 3 it was established that 9 people (45%) were involved in new product development for less than 5 years, and 11 people (55%) were involved for 5 years or more. Twenty five percent of the sample are from the marketing department, 30% from R&D, 20% from finance and 25% is from supply chain.

It was further learned that 5 individuals (25%) had graduate qualifications whilst 15 (75%) had postgraduate qualifications. Question 6 revealed that no managers were part of this sample.

Answers to question 7 revealed that 2 people (10%) felt that most projects were completed on time all of the time. The balance of the 18 respondents (90%) thought that projects were completed on time most of the time.

Refer to appendices 5 and 6 for all the tabulated data on this company. The following table indicates the spread of the personality types in the team.

Evidently there are more debaters (52.5%) than any other personality type in this sample. This is followed by 27.5% originators, 15% effecters, and 5% motivators. Appendix 7 is a pie chart reflecting this information.

4.2.3 The FMCG company

From responses to question 1 it was found that 27 (90%) of the sample are in the age group 20 – 35. Two respondents (6.67%) in this sample were in the category 36 – 45 and 1 respondent (3.33%) was from 46 – 55 years.

Question 2 revealed that 26 individuals (86.67%) of this sample were in the company for less than 5 years. Four people (13.33%) of the sample worked in the company for more than or equal to 5 years. Question 3 responses indicated that 29 people (96.67%)

were in new product development for less than 5 years, whilst 1 person was involved in new product development for 5 years or more.

Answers to question 4 revealed that 46.67% were from R&D, 26.67% were from marketing, 16.67% are from finance and 10% are from supply chain. It was learned that 2 people (6,67%) had a post matric qualification. Eleven people (36,67%) had a graduate level of education and 17 respondents (56,67%) had postgraduate qualifications. Question 6 revealed that there were no managers in the sample.

Question 7 indicated that 23 individuals (76,67%) of the sample reflected that they thought most projects were completed on time some of the time. Four people (13,33%) believed that projects were rarely completed on time and 3 people i.e. 10% felt that projects were completed on time most of the time.

Appendices 8 and 9 show all the tabulated data for the FMCG company. In the sample from the FMCG company, 45% of the sample were originators, 31.67% were effecters, 16.67% were debaters, and 6.67% were motivators. This pie chart can be found in appendix 10.

The individual personality graphs of each of the teams can be found in Appendices 17, 18 and 19.

4.3 Evaluation

4.3.1 Chemical manufacturer

From the chemical manufacturer it is evident that the majority of the team is in the age group 20 – 35. There are also more people who have been both in the company and new product development team for less than 5 years.

There were more postgraduates in the sample than any other qualification, however there was a fair number of graduates and post matric qualifications. Also, there were more people in non-management positions.

There are several ways of determining the output of such a process depending on the focus. Speed to market is one such method. Question 7 is coded: rarely (1), some of the time (2), most of the time (3), all of the time (4) and ahead of time (5).

		QUESTION 7
N	Valid	20
	Missing	0
Mean		2.8000
Median		3.0000
Mode		3.0000
Standard deviation		0.5231
Variance		0.2737

Table 3: Descriptive statistics tabulated for question 7 for chemical manufacturer

In this company the majority of the respondents feel that generally new product development projects are completed on time most of the time since the median and mode is 3. The mean is 2.8.

The team personality spread revealed that there were an equal number of originators and debaters. This appears to be healthy for the soundness of any concept that is fed through the funnel. The motivators and effectors were found to exist is smaller ratios.

4.3.2 The automobile development company

The automobile company also had majority of their respondents in the 20 – 35 age group, with the majority of the respondents involved in the company for 5 years or more. Also, more people from the sample were in new product development for more than 5 years.

		QUESTION 7
N	Valid	20
	Missing	0
Mean		3.1000
Median		3.0000
Mode		3.0000
Standard deviation		0.3078
Variance		0.0947

Table 4: Descriptive statistics tabulated for question 7 for automobile development company

The majority of this sample also has postgraduate qualifications. Also the majority of this sample feels that projects are mostly completed on time (median and mode is 3). The mean here is 3.1, i.e. a few individuals also felt that projects were completed ahead of time. Also there was less variation in the results as opposed to the variation of the chemical manufacturers responses. There were no managers in this sample.

One of the team members from the automobile development team computed the following information for this study.

Percent of projects completed on time	71%
Percent of projects completed before time	22%
Percent of projects late	7%

Table 5: Project status for the year May 2002 – June 2003

When similar information was requested from the other organisations, it was discovered that they do not have a method of measuring this status. Hence the questionnaire was structured to ask the respondents to give their thoughts on this status. As is evident the responses from the automobile development company reflect closely to the actual measured values computed.

From the assessment of the personality types it was found that debaters dominate the group. Also worthy of mention is the fact that only 5% of this sample was motivators.

4.3.3 The FMCG company

From the FMCG company it was learnt that the majority of this sample were in the 20 – 35 category. It was further discovered that an overwhelming majority of the population were in the company for less than 5 years and were also involved in the new product development process for less than 5 years. Most of this sample had postgraduate qualifications. None of the respondents were managers.

		QUESTION 7
N	Valid	30
	Missing	0
Mean		1.967
Median		2.000
Mode		2.000
Standard deviation		0.4860
Variance		0.2402

Table 6: Descriptive statistics computed for question 7

From the above we can deduce that it was strongly felt that generally projects were completed on time only some of the time. Both median and mode is 2, and the mean is 1.967.

From the personality assessments it was found that the majority of the sample were originators and only a few motivators were identified.

4.3.4 All three companies

The Pearson's correlation coefficient was calculated for the perceived output and the different personality types to establish if there exists any relationship. The following was tabulated using the SAS statistical software package.

	Perceived output	Originator	Motivator	Debater	Effecter
Perceived output	1.00000 0.0	-0.99974 0.0145	0.10856 0.9308	0.94527 0.2116	-0.99927 0.0244
Originator	0.99974 0.0145	1.00000 0.0	-0.08595 0.9452	-0.95244 0.1971	0.99988 0.0099
Motivator	0.10856 0.9308	-0.08595 0.9452	1.00000 0.0	-0.22175 0.8576	-0.07046 0.9551
Debater	0.94527 0.2116	-0.95244 0.1971	-0.22175 0.8576	1.00000 0.0	-0.95706 0.1872
Effecter	-0.99927 0.0244	0.99988 0.0099	-0.07046 0.9551	-0.95706 0.1872	1.00000 0.0

Table 7: Pearson's correlation coefficients for personality types and perceived output

These results reflect that there are strong correlations between:

- Originators and perceived output
- Debaters and perceived output
- Effecters and perceived output

However there is a strong negative correlation for originators and effecters and a strong positive correlation between debaters and perceived output. These results can be justified by the theory that was explained earlier that all types of personalities are essential for effective innovation. If too many originators exist in a team the potential hazard is that they forget the objective of the project. This is unhealthy for the team as a whole and the innovation process. Too many effectors

are also unhealthy because the originator and effecter could work together very peacefully generating ideas and producing products, but this is not effective innovation.

Effective innovation needs the Devils Advocate to refine the market offering. The feasibility and capability needs to be established. If ideas are not well thought through, they may be bound for failure in the marketplace. Even though the product may appear to be superior to any other in its market, if the target market has no need for it, it is not effective innovation.

Also considering that there are strong negative correlations of originators and effectors (-0.99974 and –0.99927 respectively) means that the less originators and effectors only, the greater the perceived output, i.e. the greater the number of projects finished on time. This is consistent with the theory that the originators and effectors dominating a team delay the process of effective innovation, since they waste valuable resources and time by putting 'half-baked' ideas through the funnel. There exists a strong positive correlation between debaters and perceived output (0.94527). This implies that debaters enhance the perceived output measured in this study.

A possible reason for the Pearsons coefficient reflecting a low correlation (0.10856) between perceived output and motivators is perhaps that they were very poorly represented in each of the samples. There evidently appears to be a lack of this personality type in all the teams. All samples had very small percentages of this personality type. The investigation of this is beyond the scope of this study, however it is suggested that this perhaps be further probed to assess if there exists a general lack of motivators in new product development teams.

Other general trends that apply to all of the above companies are that:

- Most people involved in new product development are young people in industry
- Most individuals have been in new product development for less than five years
- Most respondents had postgraduate qualifications
- Although there were varying spreads of the other 3 personalities in all teams, there appears to be a striking lack in the number of motivators in all groups.

CHAPTER 5
RECOMMENDATIONS AND CONCLUSIONS

5.1 Conclusion: Achievement of research objectives

The results support the main hypothesis that there does exist a relationship between diverse personality types in new product development teams and perceived output of the innovation process. This was obtained by the correlation coefficients of the individual personality types. Three of the sub-hypotheses have been proven i.e. that there exists a strong correlation between:

a) Originators and perceived innovation output
b) Debaters and perceived innovation output
c) Effectors and perceived innovation output

The fourth personality type was not sufficiently present in the sample chosen and hence poor Pearson's correlations were obtained. It is suggested that potential reasons for this be further investigated by other studies.

5.2 Limitations of the study

- Since non-probability sampling was used in this study, it is suggested that probability techniques be used so that such information can be inferred to bigger populations because of increased levels of significance. Also, only 3 companies were used in this study, a larger sample increases the significance levels.
- It was observed that there was an inherent lack of the motivator personality in all the samples. This should be further investigated to establish if there is a general lack in the number of this personality type in new product development teams.
- The instrument used was designed specifically for this study; hence it is recommended that it be compared with other instruments testing similar personality types to assess the reliability of the instrument.
- This study is geographically limited to the Durban area.
- There were only a few managers in one of the samples. It is suggested that more managers be represented in samples to add more value to the data.

5.3 Recommendations for further research

Owing to lack of resource and time constraints the following suggestions are made for future research. It is understood that research is never complete, it is a continuous process. We try to fill gaps, but the gaps are many and sometimes large and suggesting further research helps to close the loop. We only have a snapshot of the situation.

- In order to establish better correlations or relationships, it is suggested that cluster sampling be used so that there is a better representation of all the personality types.
- It is further recommended that similar studies assessing innovation be conducted per industry sector since such information is more valuable. This is because different industries have different length and nature of product life cycles. Also, the focus of the type of innovation may differ. For example, some organisations may have a greater focus on breakthrough innovation and hence their resources are geared appropriately to align itself with this goal.
- Also of great value is the assessment of commitment to innovation within the organisation from senior management. The climate within such institutions must be conducive to innovation or else the most dynamic teams will not deliver effective innovation. Such internal measures are also critical to assess.
- It was also learned that diverse innovation teams contribute several other benefits. Some of these areas are currently being studied. These include:
    1) Bigger and better recruitment pools
    2) Improved productivity
    3) Increased staff loyalty, morale and job satisfaction
    4) Greater customer satisfaction and sales
    5) Access to wider markets
    6) Increased staff retention
    7) Improved public relations
    8) Making the business more attractive to investors
    9) Lowered risk of discrimination claims
    10) Lowered risk of safety and health claims

The above are further potential benefits to diverse innovation teams and are worth further investigation, after all the process is largely driven by manpower.

People are essentially the force behind this process. This study has taken a closer look at teamwork, in particular the different personality types that are essential for a new product development teams to function effectively.

Innovation is a generally messy process. The process itself is a celebration of the appreciation of the diverse nature of human personality. However, it is not always smooth sailing. There have been significant learnings in this field and this process will continue to evolve for as long as you and I continue to evolve in our taste. The consumers desire for better, quicker, stronger or softer is the demand that feeds this process and as long as people and their needs grow, innovation will continue to be a necessity in any marketplace.

"For the first time in a hundred years we have the chance to truly reinvent what it means to be a large company. We have the chance to re-unite individuals with their passions. We have the chance to in many senses get the dead hand of orthodoxy and hierarchy off people's backs. We have the chance to create organisations where people can use their imagination. In the industrial age, wealth was a product of three things – how long you worked, how hard you worked, how much knowledge you brought to the job – time multiplied by diligence multiplied by expertise. It is a fact that in today's world, wealth is still partly dependent on that, but now it is more and more dependent on three different things – creativity, the ability to re-conceive (be it a company, product, service or industry) and the willingness to start something new. Bring your passion to work." (Hamel, G., 2003)

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INTERNET RESOURCES

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http://www.nfis.com.au/fig_funnel_tool.asp
http://pubs.acs.org/subscribe/journals/ci/31/i11/html/11hipple.html
http://pubs.acs.org/subscribe/journals/ci/31/i11/html/11hipple_box3.ci.html
http://www.reeusda.gov/diversity/benefits.htm
http://www.saatchikevin.com/workingit/Sandrayates_diversity-innov.html
http://www.winstonbrill.com/bril001/html/article_index/articles/1-50/article34_body.html

APPENDICES

Appendix 1

QUESTIONNAIRE

This questionnaire should take 5 - 10 minutes to complete. The objective is to assess dominant traits. These results are strictly for the purpose of this study and will not be otherwise published. Your assistance will be greatly appreciated.

Please answer the following questions:

1. Age:
2. Length of time in company:

Years:	Months:

3. Length of time in new products department:

Years:	Months:

4. Current functional operation:

Marketing	R&D	Finance	Supply chain

5. Level of education:

Matric	Post Matric	Graduate	Post Graduate

6. Are you in a management position:

Yes	No

7. Do you that think that most often projects are completed on time:

Rarely	Some of the time	Most of the time	All of the time	Ahead of time

Rank the following in order of preference. The option that is most important to you should get 4 points, the one that is second to most important should get 3 points, the third should get 2 points and the least important should get 1 point. No individual question should have any number repeated, I.e. each question should have a 1, 2, 3 and 4 rating.

8.

_____	I like discussing new ways to implement things
_____	I enjoy examining detail
_____	Routine bores me
_____	Before taking a decision, I like to know the consequence

9.

_____	I prefer to focus on what I can prove is true
_____	I prefer to focus on the future
_____	I enjoy seeing things fit together
_____	I follow what I feel

10.

_____	I like challenging the status quo
_____	I often focus on a number of things at one time
_____	I am uneasy when things are changing
_____	Others describe my thought as a - b - c -d

11.

_____	I prefer taking things a step at a time
_____	I enjoy developing my own theories/ philosophies
_____	Others say that my behavior isn't always logical
_____	Before implementing something new, I like testing it on a small scale

12.

_____	I have an eye for identifying alternatives
_____	I think things over very carefully before taking a decision
_____	I like being in the spotlight
_____	I am a firm believer in following the rules

13.

_____	I am sometimes impulsive/ hasty
_____	I tend to be very careful when trying out a new way to do things
_____	I like balance and symmetry
_____	I am good at getting to the root cause of the issue

14.

_____	I prefer to use methods that are tried and tested
_____	I like to have respect
_____	I enjoy being methodical
_____	I enjoy analysing things

15.

_____	I am comfortable in a place where there is order
_____	I find it exciting discussing concepts
_____	I am initially reluctant to try out new ideas
_____	Being flexible to change is more important than following a framework

16.

_____	It is sometimes good to unlearn the things we've learnt to help us move forward
_____	I am a firm believer of creating order
_____	I like to fit in with other people
_____	Following tradition is not high priority to me

17.

_____ I have a set pattern for problem solving/ troubleshooting
_____ I am eager and enthusiastic to work with ideas given to me
_____ I enjoy going down new paths
_____ I enjoy creating my own set of rules to follow

THANK YOU KINDLY FOR YOUR TIME.

Appendix 2

Data sheet for chemical manufacturer

Questions 1 - 7

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
54	6 years	4 years	R&D	Post graduate	Yes	Some of the time
24	3 years	3 years	Supply chain	Post matric	No	Most of the time
22	2 years	2 years	Supply chain	Post matric	No	Some of the time
32	5 years	2 years	R&D	Post graduate	No	Most of the time
26	4 years	3 years	Supply chain	Post graduate	Yes	Most of the time
44	5 years	3 years	Finance	Graduate	No	Most of the time
29	2 years	2 years	R&D	Post graduate	No	Most of the time
44	12 years	10 years	Marketing	Post graduate	Yes	Most of the time
42	6 years	5 years	Marketing	Graduate	No	Most of the time
39	5 years	5 years	Marketing	Post graduate	No	Most of the time
46	7 years	6 years	Marketing	Graduate	No	Some of the time
43	3 years	3 years	Finance	Post matric	Yes	Most of the time
36	7 years	7 years	Finance	Graduate	No	Some of the time
31	4 years	4 years	R&D	Post graduate	No	Most of the time
32	4 years	2 years	R&D	Post graduate	No	Most of the time
29	3 years	3 years	Supply chain	Post matric	No	Most of the time
25	3 years	3 years	Supply chain	Post matric	No	Some of the time
27	4 years	3 years	R&D	Graduate	No	Most of the time
25	2 years	2 years	Supply chain	Post matric	No	All of the time
30	4 years	4 years	Finance	Post graduate	No	Most of the time

Table 8: Data for questions 1 – 7 for chemical manufacturer

Appendix 3

Data sheet for chemical manufacturer
Questions 8 - 17 interpretation

Originator	Motivator	Debater	Effecter	Total	HIGHEST
288	200	414	287.5	1189.5	D
286	275	351	337.5	1249.5	D
280	270	350	337.5	1237.5	D
495	363	225	165	1248	O
462	322	264	184	1232	O
220	374	240	408	1242	E
340	442	200	260	1242	M
442	323	273	199.5	1237.5	O
384	336	276	241.5	1237.5	O
352	416	220	260	1248	M
387.5	250	372	240	1249.5	O
279	216	418.5	324	1237.5	D
195.5	306	276	432	1209.5	E
325	300	325	300	1250	0.5O, 0.5D
338	234	390	270	1232	D
308	336	286	312	1242	M
256.5	337.5	275.5	362.5	1232	E
361	323	247	221	1152	O
260	273	330	346.5	1209.5	E
260	247	350	332.5	1189.5	D

Table 9: Tabulation of area values within each of the four quadrants for chemical manufacturer

Appendix 4

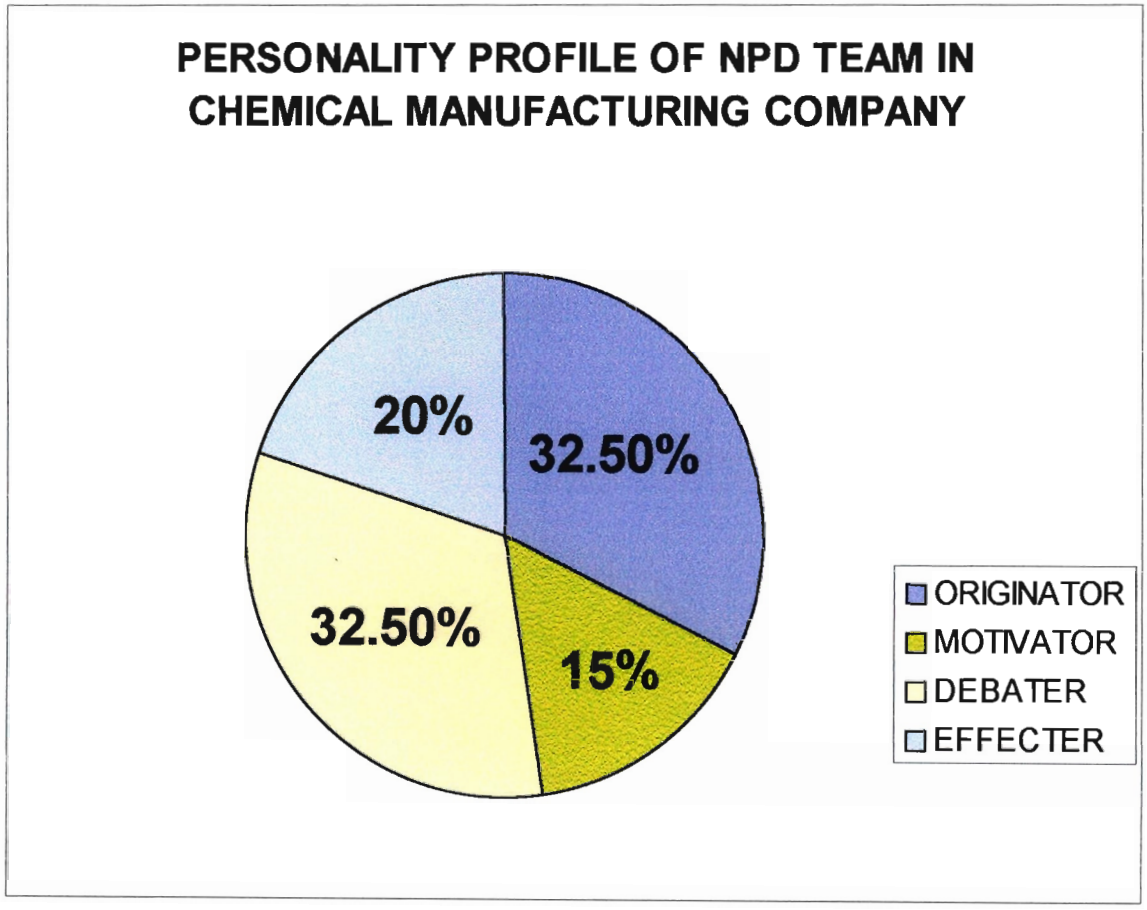


Figure 6: Graphic representation of personality distribution for the chemical manufacturing company

Appendix 5

Data sheet for Automobile Development Company

Questions 1 - 7

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
26	5 years	3 years	R&D	Graduate	No	All of the time
38	12 years	9 years	R&D	Post graduate	No	Most of the time
31	8 years	3 years	R&D	Post graduate	No	Most of the time
29	5 years	5 years	R&D	Post graduate	No	Most of the time
34	6 years	4 years	R&D	Post graduate	No	Most of the time
33	9 years	6 years	R&D	Post graduate	No	Most of the time
36	8 years	7 years	Marketing	Post graduate	No	Most of the time
28	5 years	4 years	Finance	Post graduate	No	Most of the time
32	9 years	7 years	Finance	Graduate	No	Most of the time
34	9 years	7 years	Marketing	Post graduate	No	Most of the time
33	9 years	6 years	Supply chain	Graduate	No	Most of the time
31	7 years	5 years	Supply chain	Post graduate	No	Most of the time
29	6 years	5 years	Finance	Post graduate	No	Most of the time
31	2 years	2 years	Marketing	Graduate	No	Most of the time
29	6 years	4 years	Marketing	Post graduate	No	Most of the time
31	5 years	5 years	Supply chain	Post graduate	No	Most of the time
33	6 years	5 years	Finance	Post graduate	No	Most of the time
30	4 years	4 years	Supply chain	Graduate	No	Most of the time
28	5 years	4 years	Supply chain	Post graduate	No	All of the time
33	4 years	3 years	Marketing	Post graduate	No	Most of the time

Table 10: Data for questions 1 – 7 for automobile development company

Appendix 6

Originator	Motivator	Debater	Effecter	Total	HIGHEST
407	187	444	204	1242	D
374	264	340	240	1218	O
385	264	332.5	228	1209.5	O
306	243	357	283.5	1189.5	D
255	289	285	323	1152	D
306	261	323	275.5	1165.5	D
340	290	289	246.5	1165.5	O
346.5	252	363	264	1225.5	D
315	243	350	270	1178	D
352	297	304	256.5	1209.5	O
289	263.5	306	279	1137.5	D
314.5	221	370	260	1165.5	E
314.5	221	370	260	1165.5	D
306	212.5	396	275	1189.5	D
324	252	324	252	1152	0.5D, 0.5O
272	248	323	294.5	1137.5	D
250	275	330	363	1218	E
247	260	332.5	350	1189.5	E
351	390	207	230	1178	M
370	333	250	225	1178	O

Table 11: Tabulation of area values within each of the 4 quadrants (automobile development company)

Appendix 7

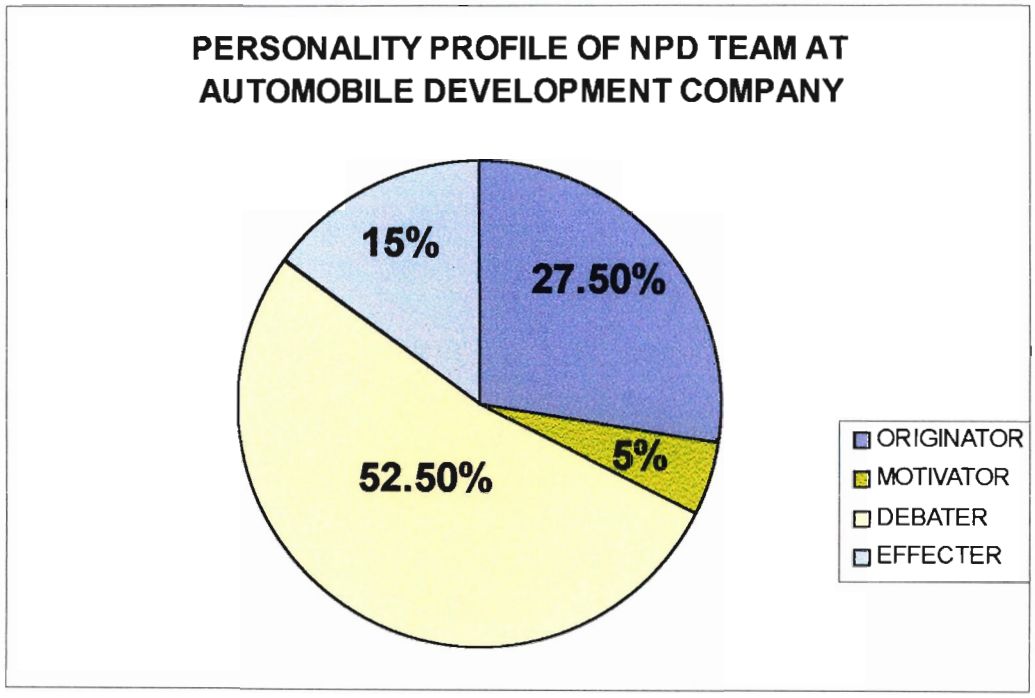


Figure 7: Graphic representation of personality distribution for the automobile development company

Appendix 8

Data sheet for FMCG company

Questions 1 - 7

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
28	3 years	3 years	R&D	Post graduate	No	Some of the time
26	3 years	3 years	R&D	Post graduate	No	Some of the time
28	1 year	1 year	R&D	Post graduate	No	Some of the time
25	1 year	1 year	R&D	Graduate	No	Rarely
46	22 years	3 years	R&D	Post matric	No	Some of the time
44	25 years	1 year	R&D	Post matric	No	Most of the time
29	2 years	1 year	R&D	Graduate	No	Some of the time
28	4 years	2 years	R&D	Graduate	No	Some of the time
26	1 year	1 year	R&D	Post graduate	No	Some of the time
27	3 years	3 years	R&D	Post graduate	No	Rarely
30	3 years	2 years	R&D	Post graduate	No	Some of the time
31	4 years	4 years	R&D	Post graduate	No	Some of the time
27	4 years	4 years	R&D	Post graduate	No	Some of the time
39	4 years	4 years	R&D	Graduate	No	Some of the time
24	1 year	2 years	Marketing	Graduate	No	Some of the time
27	3 years	2 years	Marketing	Post graduate	No	Some of the time
26	2 years	2 years	Marketing	Post graduate	No	Some of the time
27	4 years	3 years	Marketing	Graduate	No	Most of the time
28	4 years	2 years	Marketing	Post graduate	No	Some of the time
30	3 years	3 years	Marketing	Post graduate	No	Some of the time
29	4 years	2 years	Marketing	Graduate	No	Rarely

Appendix 8 continued

Data sheet for FMCG company

Questions 1 - 7

Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
25	2 years	2 years	Marketing	Graduate	No	Rarely
29	4 years	3 years	Finance	Post graduate	No	Some of the time
26	1 year	1 year	Finance	Graduate	No	Rarely
27	2 years	2 years	Finance	Post graduate	No	Most of the time
30	2 years	2 years	Finance	Post graduate	No	Some of the time
34	6 years	5 years	Finance	Graduate	No	Some of the time
32	5 years	3 years	Supply Chain	Graduate	No	Some of the time
28	2 years	1 year	Supply Chain	Post graduate	No	Some of the time
29	3 years	3 years	Supply Chain	Post graduate	No	Some of the time

Table 12: Data for questions 1 – 7 for FMCG company

Appendix 9

Originator	Motivator	Debater	Effecter	Total	HIGHEST
592	333	208	117	1250	O
612	270	255	112.5	1249.5	O
198	288	308	448	1242	E
224	224	392	392	1232	0.5D, O.5E
276	368	252	336	1232	M
237.5	266	350	392	1245.5	E
170	255	290	435	1150	E
464	232	368	184	1248	O
209	396	218.5	414	1237.5	E
364.5	297	324	264	1249.5	O
408	240	374	220	1242	O
396	228	396	228	1248	0.5O, 0.5D
357	178.5	476	238	1249.5	D
178.5	367.5	229.5	472.5	1248	E
425.5	218.5	388.5	199.5	1232	O
408	240	374	220	1242	O
372	264	356.5	253	1245.5	O
364.5	297	324	264	1249.5	O
444	333	252	189	1218	O
425	323	275	209	1232	O
475	323	250	170	1218	O
300	360	262.5	315	1237.5	M
260	247	350	332.5	1189.5	D
300	204	425	289	1218	D
310.5	207	432	288	1237.5	D
240	340	264	374	1218	E
230	240	379.5	396	1245.5	E
378	270	350	250	1248	O
210	240	367.5	420	1237.5	E
231	264	346.5	396	1237.5	E

Table 13: Tabulation of area values within each of the 4 quadrants (FMCG company)

Appendix 10

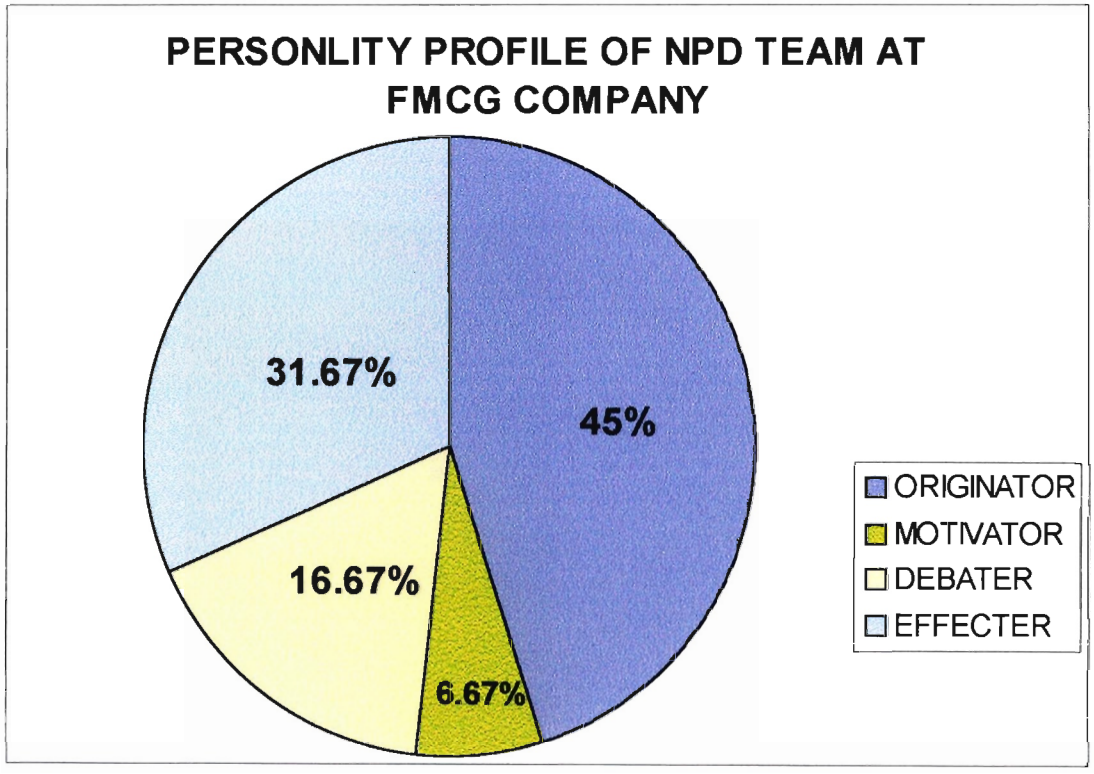


Figure 8: Graphic representation of personality distribution for the FMCG company

Appendix 11

Functional Department	Number of respondents	Percent of respondents
Marketing	4	20%
R&D	6	30%
Finance	4	20%
Supply chain	6	20%

Table 14: Table representing number of respondents in functional departments for chemical manufacturing company

Functional Department	Number of respondents	Percent of respondents
Marketing	5	25%
R&D	6	30%
Finance	4	20%
Supply chain	5	25%

Table 15: Table representing number of respondents in functional departments for automobile development company

Functional Department	Number of respondents	Percent of respondents
Marketing	14	46.67%
R&D	8	26.67%
Finance	5	16.67%
Supply chain	3	10%

Table 16: Table representing number of respondents in functional departments for the FMCG company

Appendix 12

	Number in sample	Percentage of sample
No. of originators	6.5	32.5%
No. of motivators	3	15%
No. of debaters	6.5	32.5%
No. of effecters	4	20%
Total	20	100

Table 17: Results showing the number of each personality in the chemical manufacturing company

	Number in sample	Percentage of sample
No. of originators	5.5	27.5%
No. of motivators	1	5%
No. of debaters	10.5	52.5%
No. of effecters	3	15%
Total	20	100

Table 18: Results showing the number of each personality in the automobile development company

	Number in sample	Percentage of sample
No. of originators	13.5	45%
No. of motivators	2	6.67%
No. of debaters	5	16.67%
No. of effecters	9.5	31.67%
Total	30	100

Table 19: Results showing the number of each personality type in the FMCG company.

Appendix 13

Respondent	Conceptual thought	Linear thought	Individualistic behaviour	Conforming behaviour
1	36	25	16	23
2	26	25	22	27
3	28	27	20	25
4	30	22	33	15
5	33	23	28	16
6	36	25	16	23
7	20	26	34	20
8	26	19	34	21
9	24	21	32	23
10	22	26	32	20
11	31	20	25	24
12	31	24	18	27
13	23	36	17	24
14	26	24	25	25
15	26	18	26	30
16	22	24	28	26
17	19	25	27	29
18	19	17	38	26
19	20	21	26	33
20	20	19	26	35

Table 20: Scores for extreme thought and behaviour for chemical manufacturer

Appendix 14

Respondent	Conceptual thought	Linear thought	Individualistic behaviour	Conforming behaviour
1	37	17	22	24
2	34	24	22	20
3	35	24	22	19
4	34	27	18	21
5	39	26	16	19
6	34	29	18	19
7	34	29	20	17
8	33	24	21	22
9	35	27	18	20
10	32	27	22	19
11	34	31	17	18
12	30	34	17	19
13	37	26	17	20
14	36	25	17	22
15	36	28	18	18
16	34	31	16	19
17	20	22	25	33
18	19	20	26	35
19	18	20	39	23
20	20	18	37	25

Table 21: Scores for extreme thought and behaviour for automobile development company

Appendix 15

Respondent	Conceptual thought	Linear thought	Individualistic behaviour	Conforming behaviour
1	32	18	37	13
2	34	15	36	15
3	22	32	18	28
4	28	28	16	28
5	24	32	23	21
6	25	28	19	28
7	22	31	18	29
8	32	16	29	23
9	19	36	22	23
10	27	22	27	24
11	34	20	24	22
12	33	19	24	24
13	34	17	21	28
14	17	35	21	27
15	37	19	23	21
16	34	20	24	22
17	31	22	24	23
18	27	22	27	24
19	24	18	37	21
20	25	19	34	22
21	25	17	38	20
22	25	30	24	21
23	20	19	26	35
24	25	17	24	34
25	27	18	23	32
26	24	34	20	22
27	23	24	20	33
28	36	17	25	22
29	21	24	20	35
30	21	24	22	33

Table 22: Scores for extreme thought and behaviour for FMCG company

Appendix 16

Variable	N	Mean	Std dev	Median	Minimum	Maximum
CT	30	26.933333	5.501933	25.000000	17.000000	37.000000
LT	30	23.100000	6.375330	21.000000	15.000000	36.000000
IB	30	24.666667	5.992716	24.000000	16.000000	38.000000
CB	30	25.100000	5.591558	23.500000	13.000000	35.000000

Table 23: Descriptive statistics for FMCG company

Variable	N	Mean	Std dev	Median	Minimum	Maximum
CT	20	31.5500000	6.5972482	34.0000000	18.0000000	39.0000000
LT	20	25.4500000	4.4659531	26.0000000	17.0000000	34.0000000
IB	20	21.4000000	6.3775924	19.0000000	16.0000000	39.0000000
CB	20	21.6000000	4.7284136	19.0000000	17.0000000	35.0000000

Table 24: Descriptive statistic for automobile company

Appendix 16 continued

Variable	N	Mean	Std dev	Median	Minimum	Maximum
CT	20	25.900000	5.476265	26.000000	19.000000	36.000000
LT	20	23.350000	4.171015	24.000000	17.000000	36.000000
IB	20	26.150000	6.491087	26.000000	16.000000	38.000000
CB	20	24.600000	4.988408	24.500000	15.000000	35.000000

Table 25: Simple statistics for chemical manufacturer

KEY:

CT: CONCEPTUAL THOUGHT

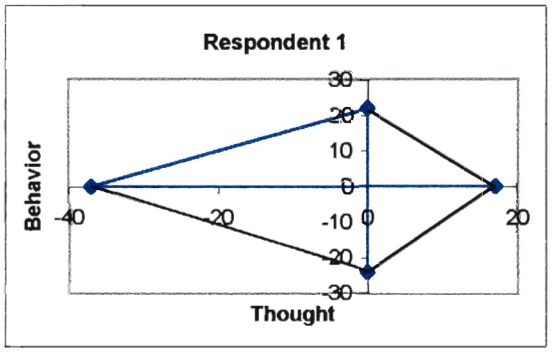
LT: LINEAR THOUGHT

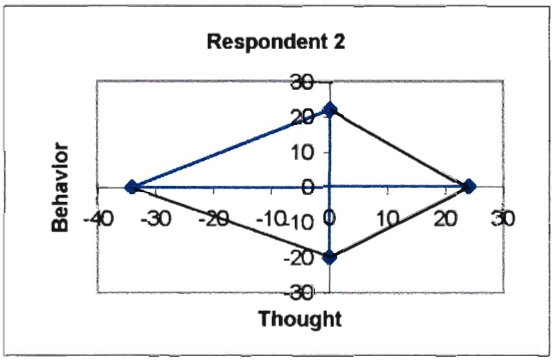
IB: INDIVIDUALISTIC BEHAVIOUR

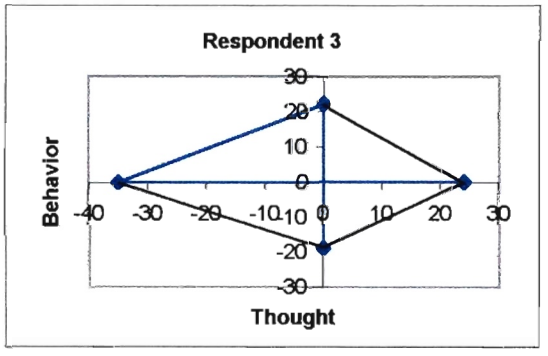
CB: CONFORMING BEHAVIOUR

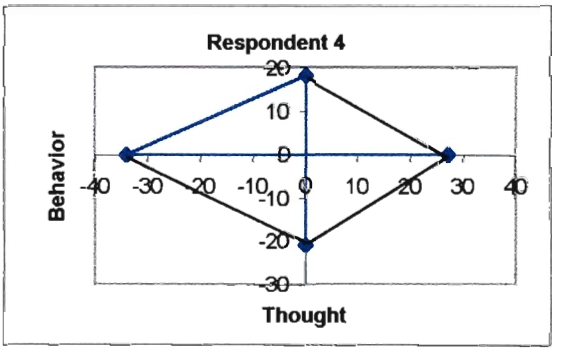
Appendix 17

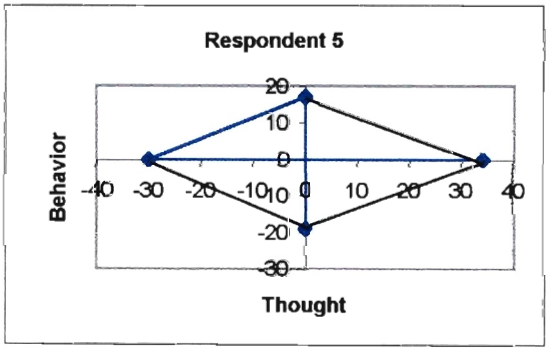
Individual personality graphs for automobile development team

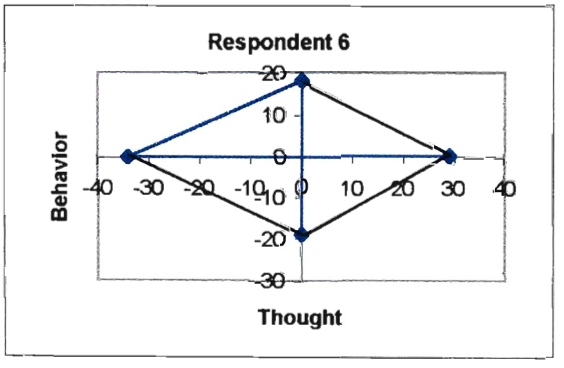


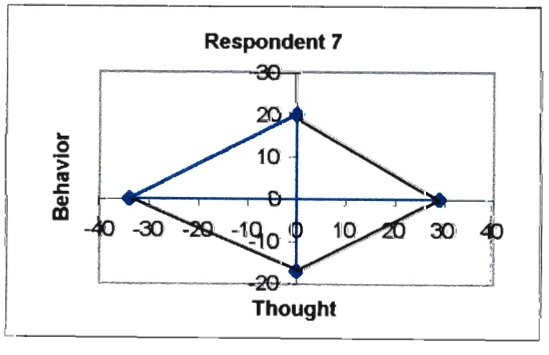


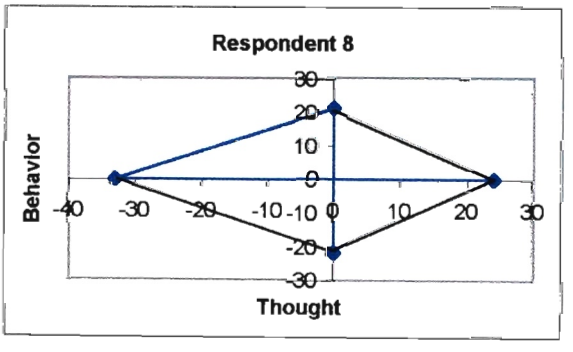












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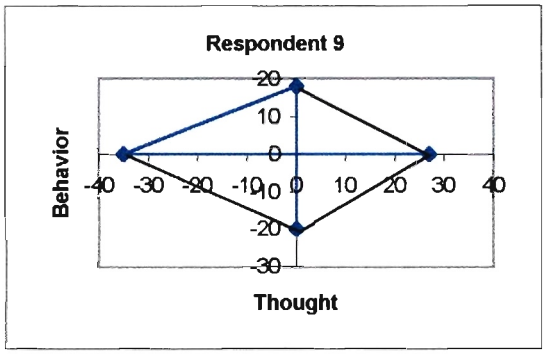

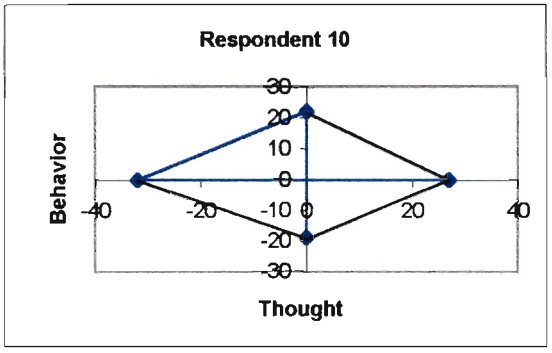

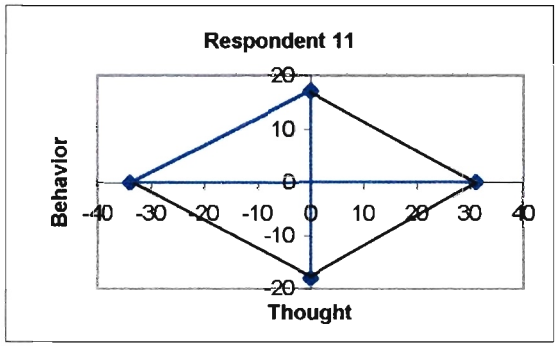

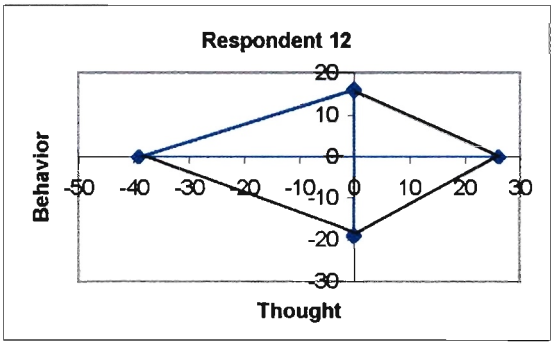

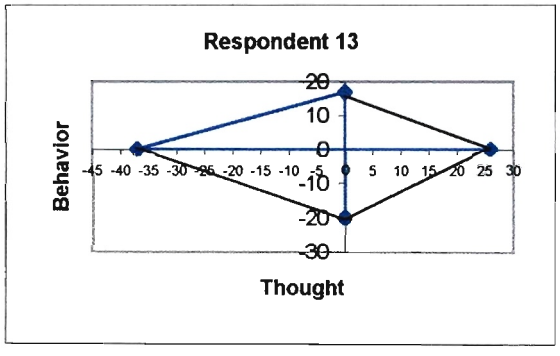

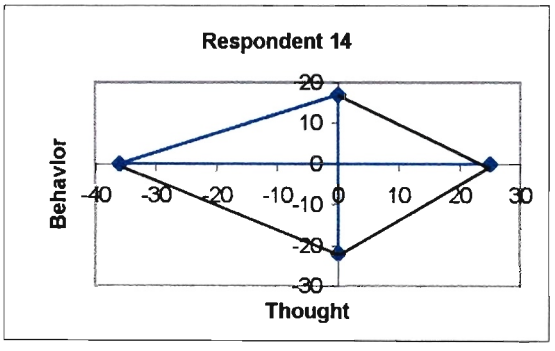

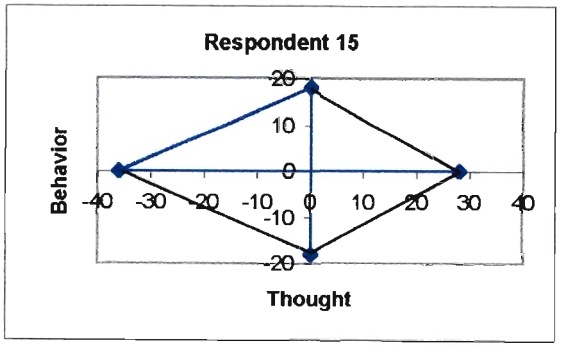

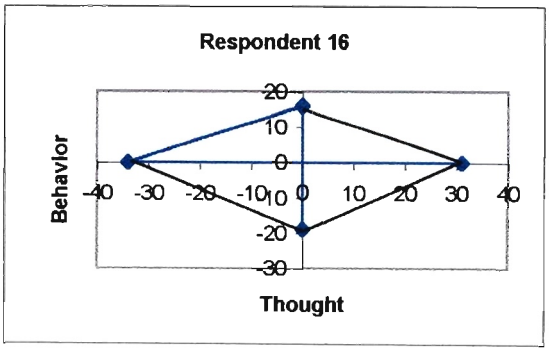

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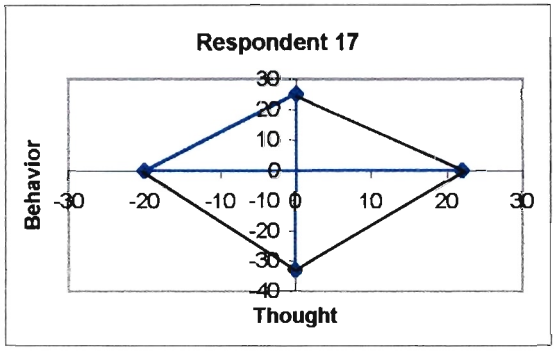
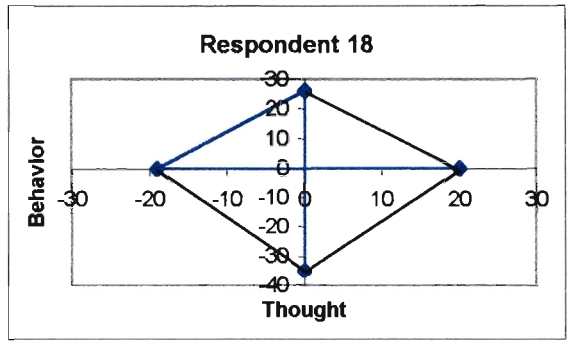
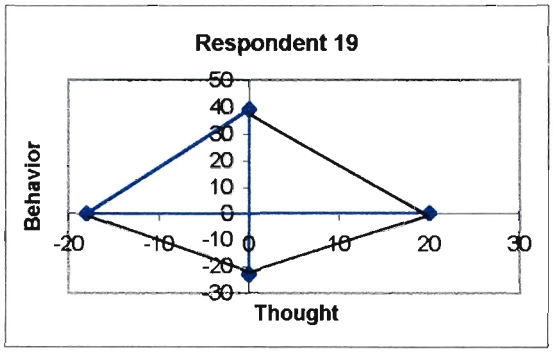
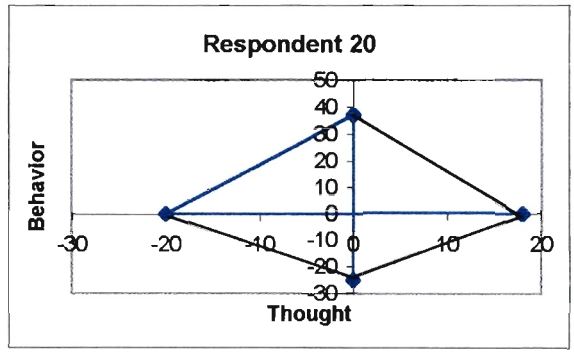


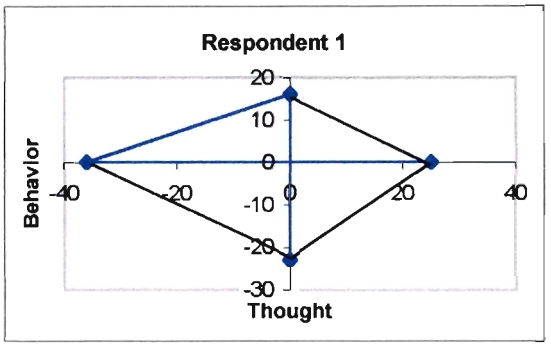


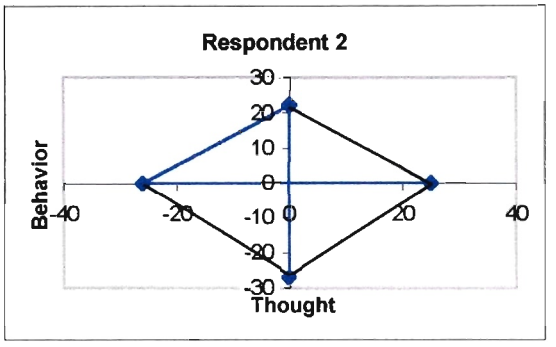


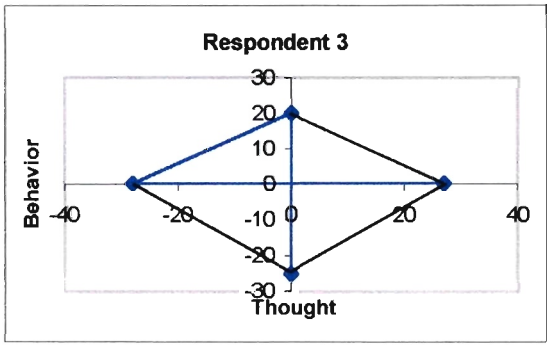


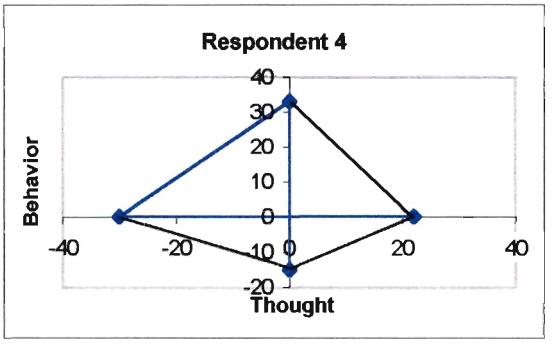
Appendix 18

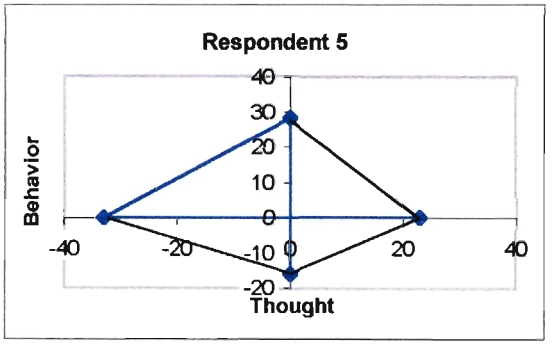
Individual personality graphs from chemical manufacturer

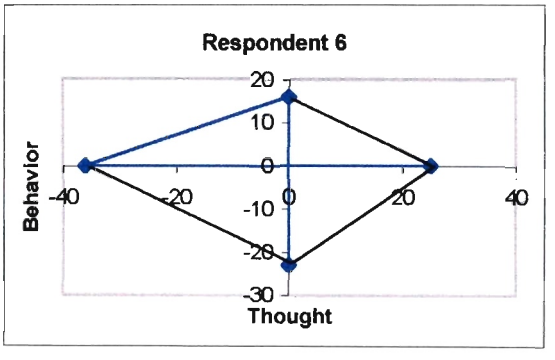


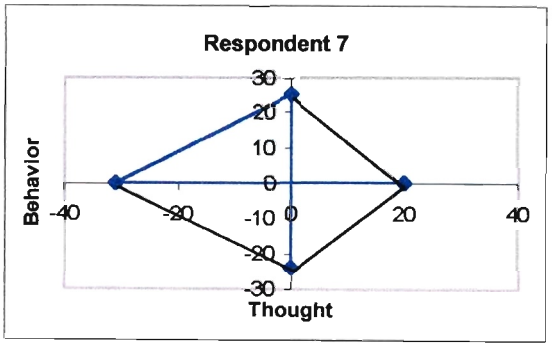


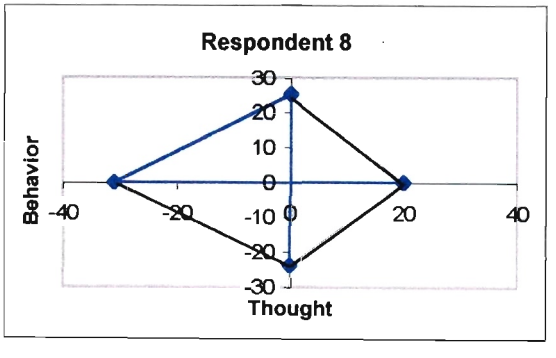












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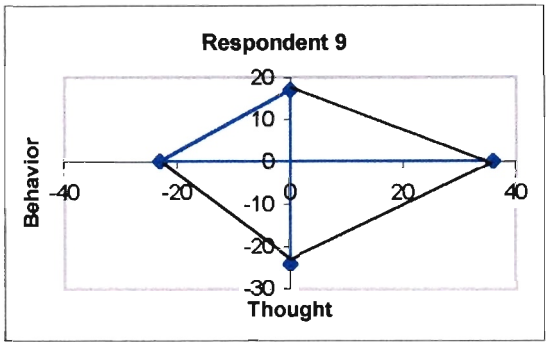

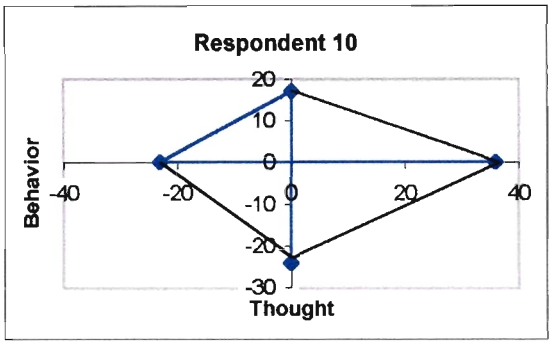

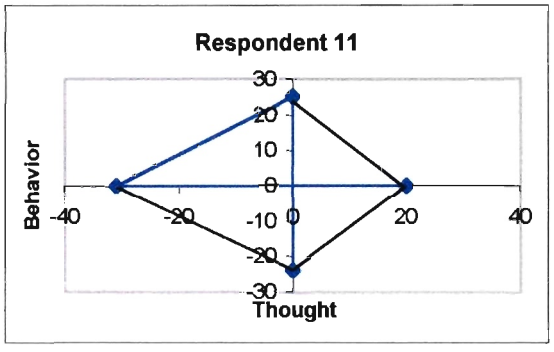

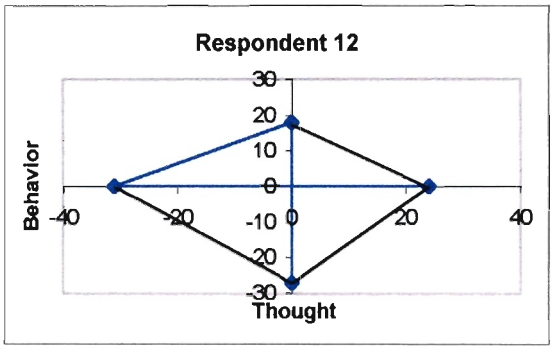

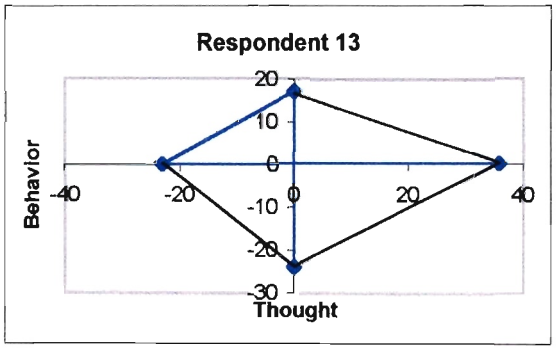

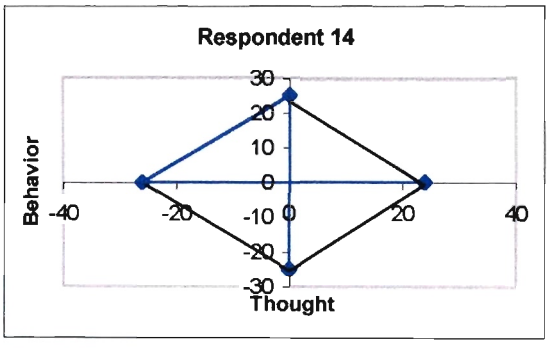

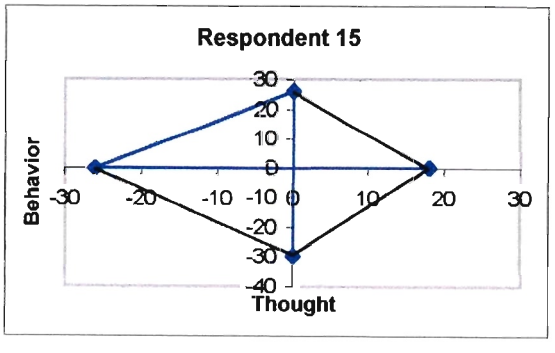

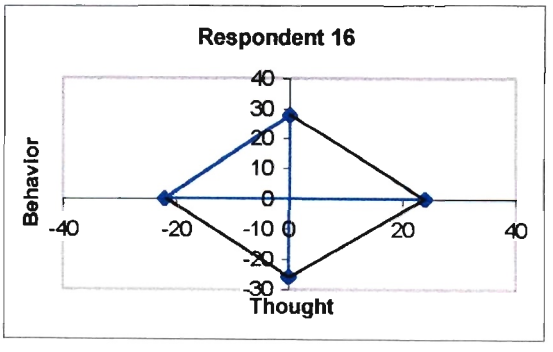

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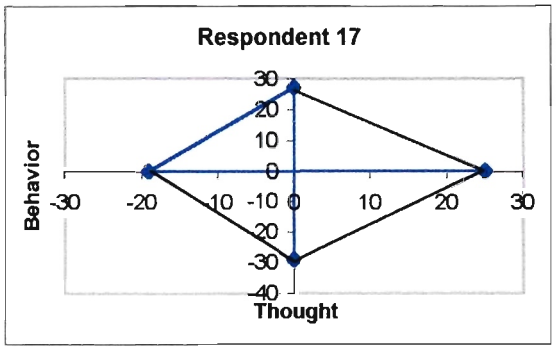
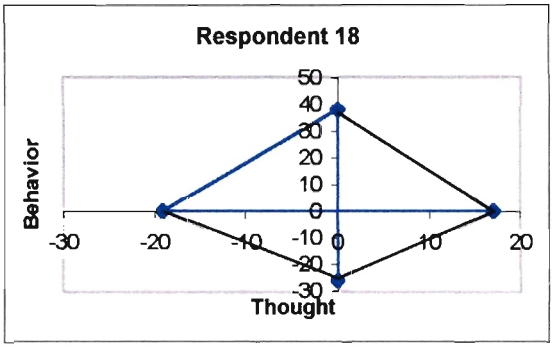
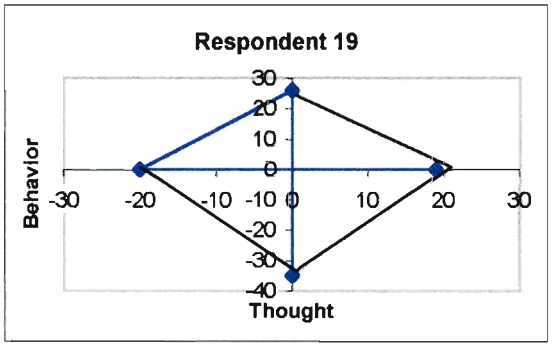
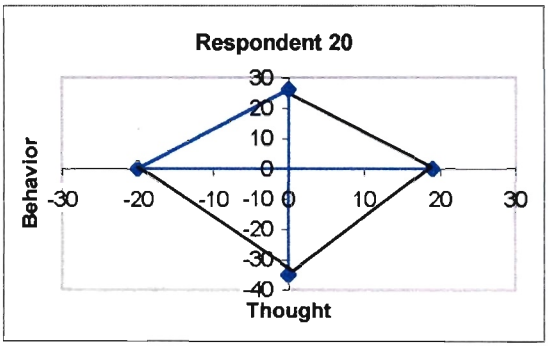


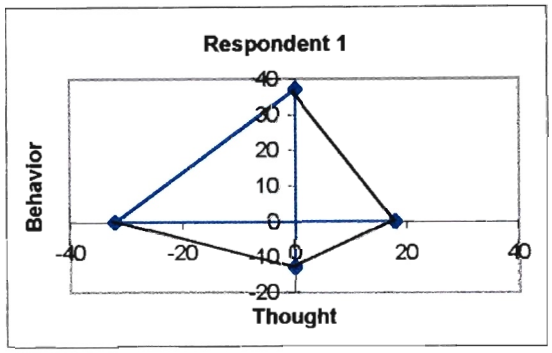


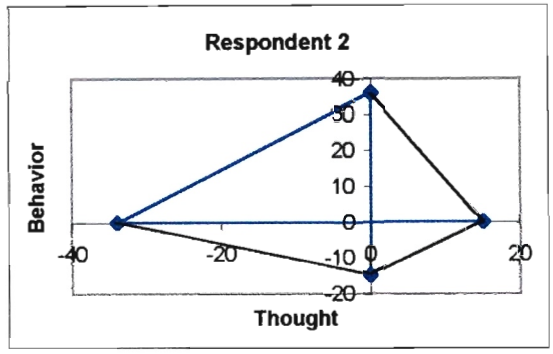


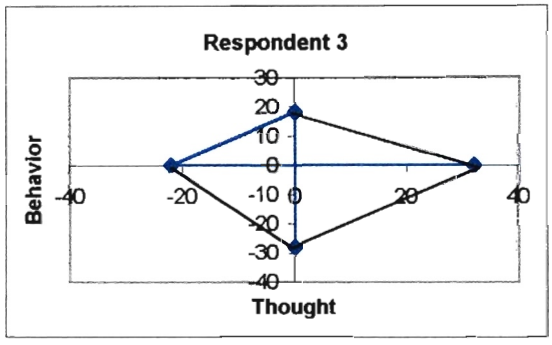


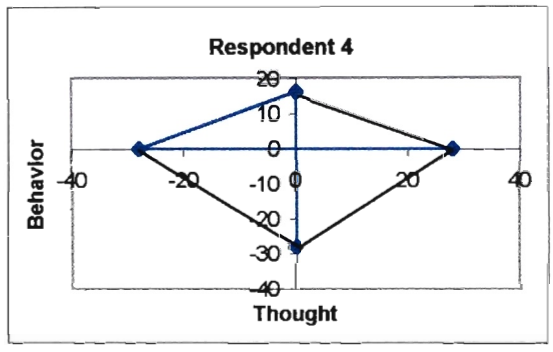
Appendix 19

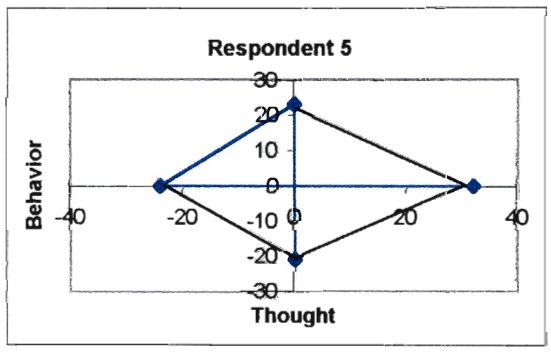
Individual personality graphs from FMCG company

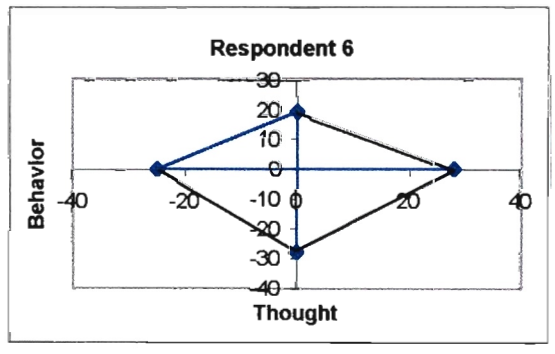


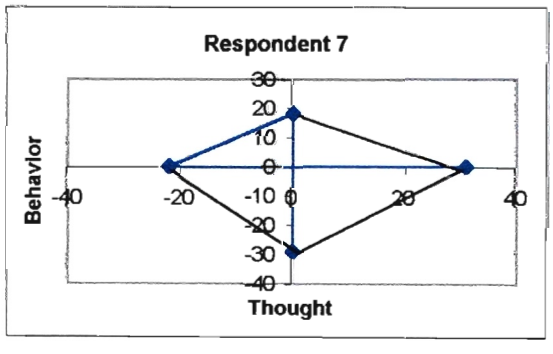


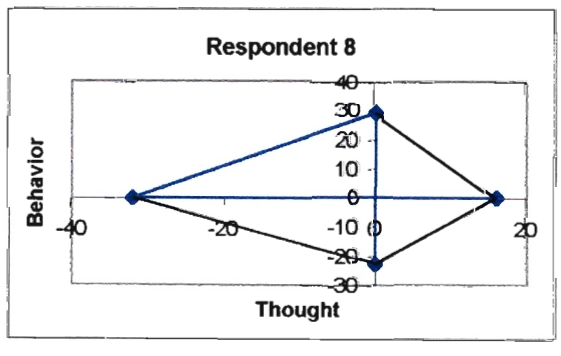




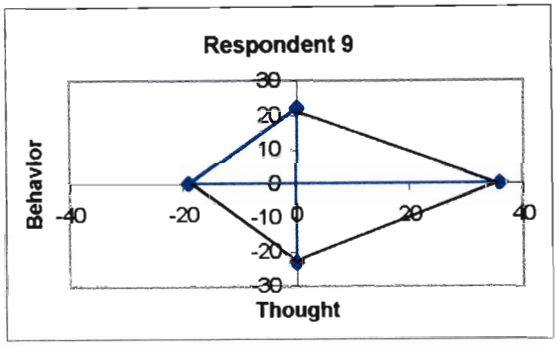


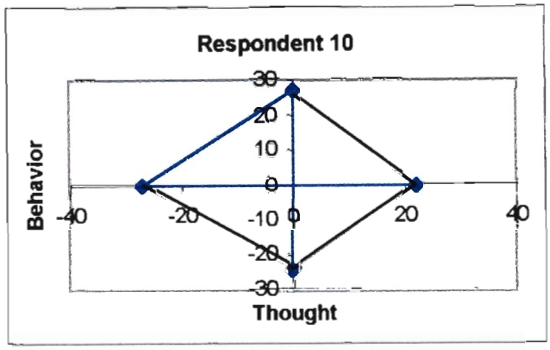


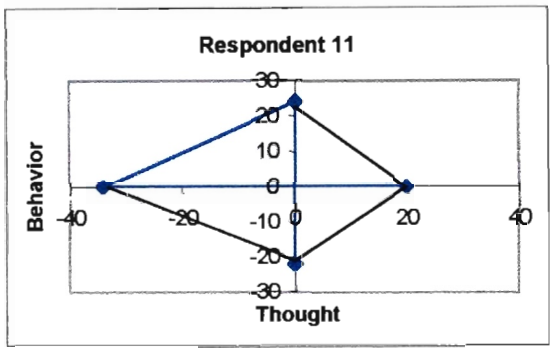


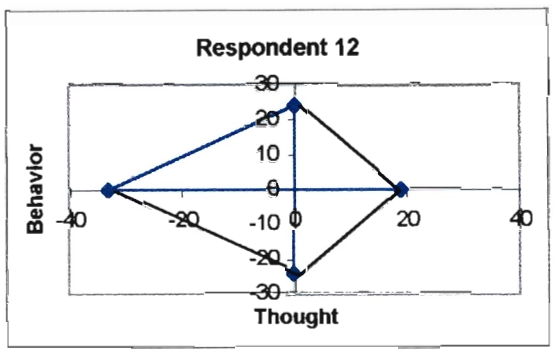


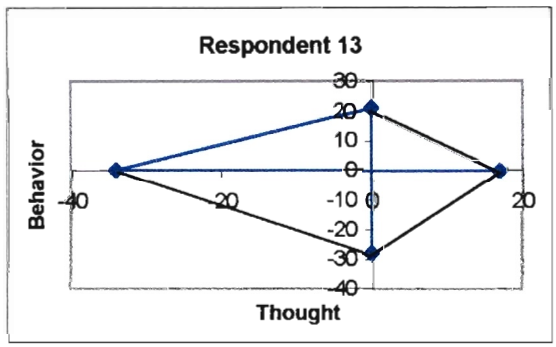
Appendix 19 continued

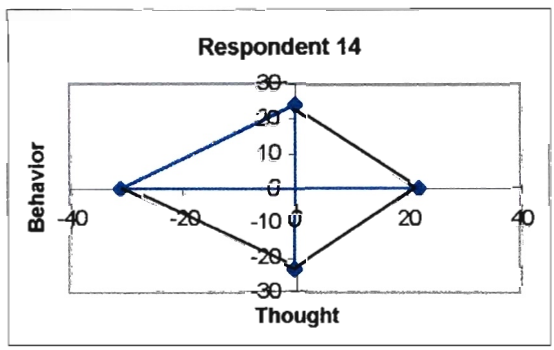


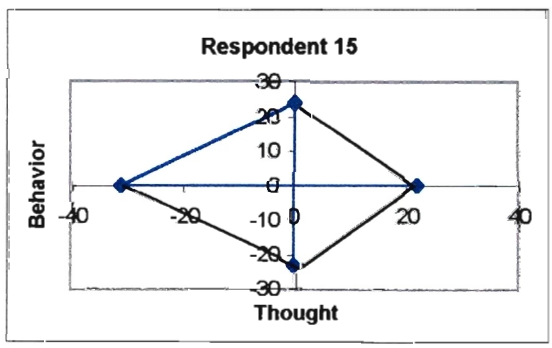


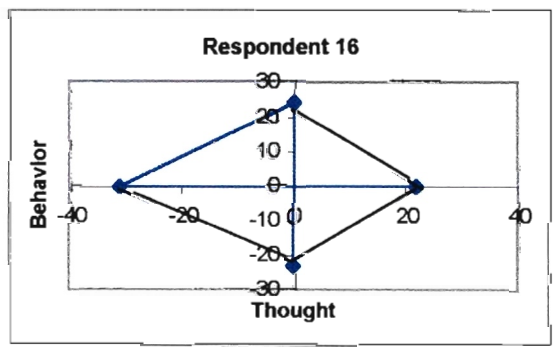












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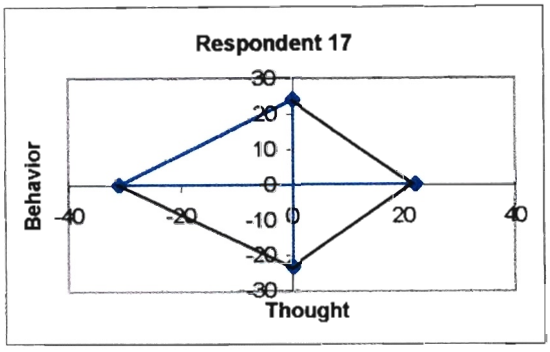

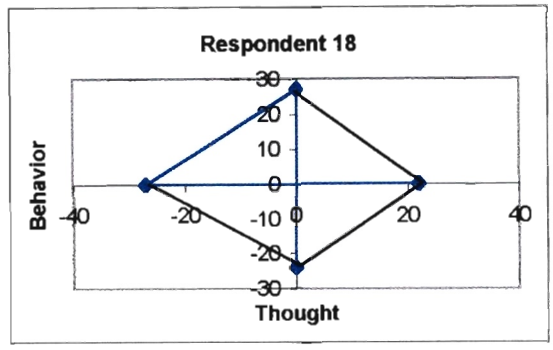

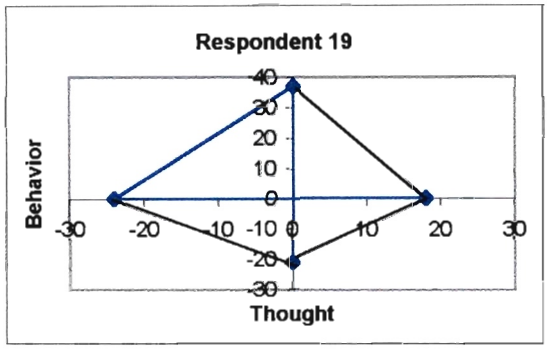

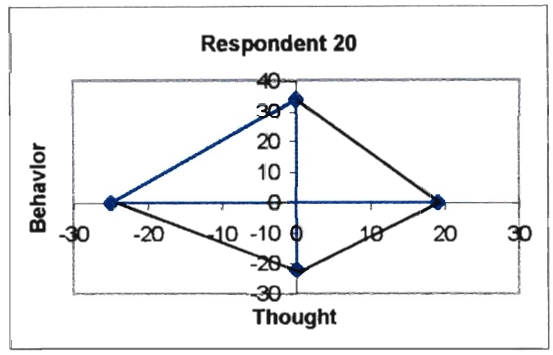

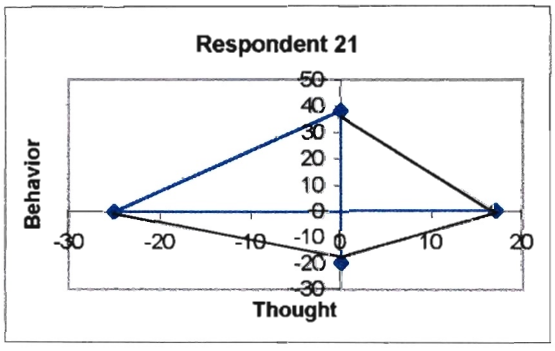

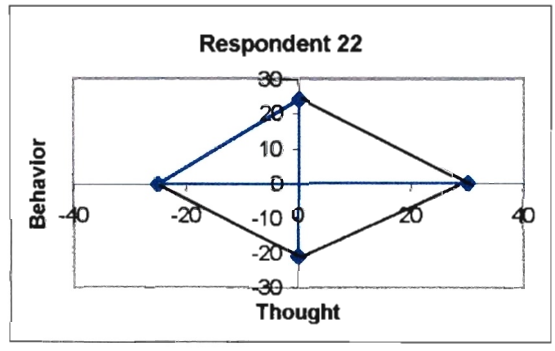

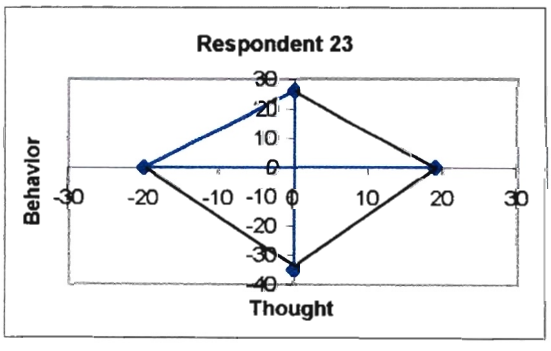

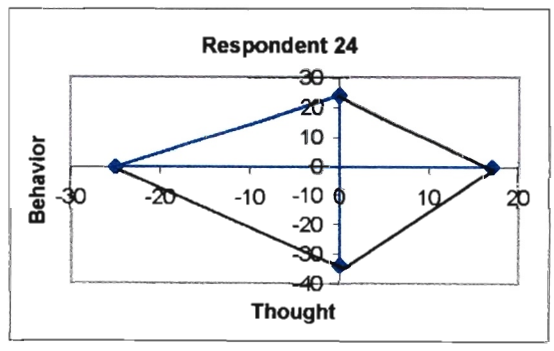

Appendix 19 continued