THE EFFECT OF PERSONALITY ON THE DESIGN TEAM: LESSONS FROM INDUSTRY FOR DESIGN EDUCATION

Christian MCLENING[1] **and Lyndon BUCK**[2]
[1] Aston University, UK
[2] Buckinghamshire New University, UK

ABSTRACT

This study examines the effect of individual character types in design teams through case studies at ARUP associates and five United Kingdom university design degree programmes. By observing an individual's approach and contribution within a team, patterns of design behaviour are highlighted and compared within the industrial and academic examples. Initial findings have identified discreet differences in design approach and ways of working. By identifying these initial character clusters, design behaviour can be predicted to help teams and individuals to strengthen their design process. This research brings together:

1. The design process and how engineering and design teams work to solve problems.
2. The natural characteristics of individuals and how they approach problems.

This difference of approach can be viewed in relation to the design process where engineers and designers will recognise their preference for certain stages of the design process. This study suggests that these individual preferences are suited to different stages of the design process, and that industry uses teams to ensure a broad range of views, an approach design education would do well to apply by establishing collaborative input in the design process.

Keywords: Character type, design teams, cross-disciplinary

1 METHODOLOGY

Case studies examine the 'Character Types' of designers evaluated through the principles outlined initially by Carl Jung[1] and later by psychologists Myers Briggs[2] and Kerisy[3].

The paper follows on from research presented at Sustainable Innovation 2005[4] and Sustainable Innovation 2008[5]. The Myers Briggs Type Indicator Test (MBTI)[6], the Similarminds online site [7] and the Kerisy Character test are all derived from the work of Jung and are well established in applications where team dynamics and approaches can be readily evaluated.

Several studies have examined character type in undergraduates with regard to the creative process and teams such as those of Dym & Agogino (2005)[8] and Felder & Felder (2002)[9] both explore the issues of character type and design. However both studies focus on engineering students only. This study examines the wider spectrum of design in industry and academia including engineering, product design, three dimensional design and architecture, observing the differences of approach between these groups and how they interact during the design process. Clearly the character type analysis is only one element that can influence design behaviour but despite this limitation it was felt the findings were still a valuable indicator of different design approaches and hence a good start for initial study with the view for further detailed exploration.

Just as we have a preferred foot to kick a ball, the preference becomes the most comfortable to use and hence more practiced, so the work of Jung and others has put forward a similar cognitive preference. These preferred ways of thinking can suggest people's natural 'preferred' ways of making decisions, but should not been seen as definitive. The MBTI test has been the starting point for a number of studies that has suggested people are drawn to professions that suit their character type preference. The MBTI table suggests some cultural themes of approach and focus with the clustered preferences shaded in the following tables:

Table 1.

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

Table 1 shows **S**- Sensing has a factual concrete focus. **N**- Intuition has an abstract, ideas & possibilities focus.

Table 2.

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

Table 2 shows **T**- Thinking focuses on objective cause and effect. **F**-Feeling focuses on Human issues and impact.

Table 3.

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

Table 3 shows **I**-Introversion, has an internal reflective approach, often pondering an issue before presenting. **E**-Extroversion processes and thinks externally, often verbally talking through ideas.

It was decided to select a range of students to reflect the profile of the group at ARUP, so courses range from BA and BSc to BEng. The students were given the same induction and questions to establish their character type as with ARUP employees, then the student's individually selected major design projects were recorded to explore any possible trends or patterns.

2   DESIGN INDUSTRY CASE STUDY- ARUP ASSOCIATES EUROPE:

During the last two years embedded research has been carried out by the author within ARUP Product Design Group's London Office (10). By working directly with the design team an in-depth study of the real world issues and processes could be studied. This study followed the Product Design group who work in collaboration with engineers, architects and others in areas such as systems design. The immediate group involved with the Product Design were evaluated to identify their character type. The way the individuals would interact and contribute to design projects was also observed, noting the timings of project involvement and working relationships.

The second studies with ARUP associates brought the test to a more focused group of ARUP employees. ARUP Design Schools are a biannual event where employees within their first 5 years working for ARUP are invited to a three day event to develop and enhance their creative working practice, expose them to other company employees and build more design team skills. With groups of 36 ARUP designers, engineers and architects two events were tested and the groups put into design teams for a project supported with lectures, seminars and presentations focused around themes of creative design process. The same character type evaluation was run with these groups and their individual types recorded. The design sessions were observed to identify any patterns of behaviour that could be attributed to character type preferences of approach. It should be noted both Design School sessions included a range of employees from across ARUP Europe with a diverse range of specialist backgrounds

The industrial case study group in this study is the Product Design group at ARUP London (Table 4 & Figure 1). ARUP is a global consultancy working in a broad range of fields with a technical focus covering construction, design, research and planning. The Product Design group was observed in relation to their internal links and relationships in everyday design activity. The wider ARUP community was also investigated through the ARUP junior design school with engineers, architects,

designers all working together on creative workshop projects. ARUP highlighted the range of professionals working together and the spectrum of backgrounds and character types.

Table 4. ARUP Design Staff 8/7/2009

ISTJ 2	ISFJ 1	INFJ 3	INTJ 1
ISTP 1	ISFP 1	INFP 0	INTP 2
ESTP 0	ESFP 1	ENFP 0	ENTP 4
ESTJ 0	ESFJ 1	ENFJ 1	ENTJ 0
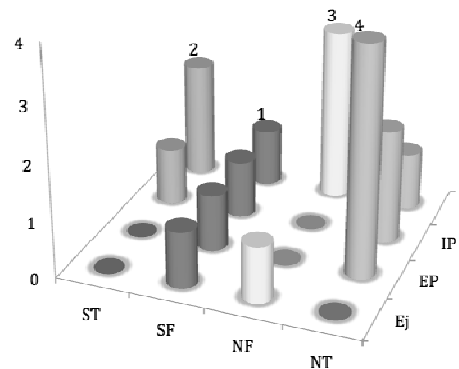
Figure 1. ARUP Design office MBTI results

A mixed office including product designers-all INFJ; architects-2 INTP, 1 ENTP, 1 ISFP; engineers (structural, mechanical)- 2 ISTJ, 1 ISTP, 3 ENTP, 1 INTJ; managers/admin/support- 1 ISFJ, 1 ESFP, 1 ESFJ, 1 ENFJ. It should be noted that the Product Design team were all an identical type. The engineering team was a mix of 1st and 4th column, while the architects were mainly 4th column. The managers and support staff were all 2nd column.

Embedded research in the form of design consultancy within the Product Design group was carried out during 2008, 2009 and 2010. The London Product Design team is a small group involved with new product development generated from internal projects, external contracts and connected ARUP work such as commercial seating, flooring systems and stadium seating. With ARUP involved in consultancy in a vast number of areas such as construction, environment, planning and structural design it is clearly essential that the product designers can interact with the wider community of experts and as such much of ARUP's working practices involves multiple design teams with a variety of specialists in each. It was this mixture of specialists and the way they work and approach design problems that exposed some interesting observations:

1. The Product Design team were good at coordinating and engaging with professionals across the whole ARUP community. More that any other group the Product team need to explain designs and manage the design process with marketing, legal contract teams, structural materials experts, external manufacturers, systems designers, consumer groups and managers.
2. The Product Design team (all INFJ) were very good at exploring the commercial need for products, the human and social aspects and also issues of user needs and requirements.
3. The Product Design team would engage specialists for more detailed development where needed, such as FEA where a structural or materials engineer (column 1) would contribute.
4. The Product Design team operated as a hub, bringing in many specialists and coordinating these very well. They had a very good awareness of project scale and time.

Table 5. ARUP Design Schools: 2/4/2009 & 5/11/2009

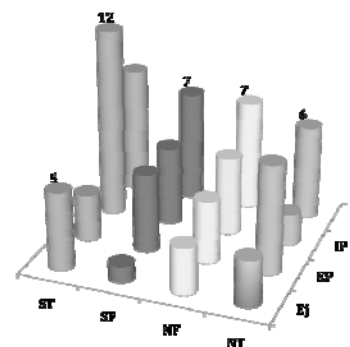|			
ISTJ 8	ISFJ 7	INFJ 7	INTJ 6
ISTP 12	ISFP 5	INFP 5	INTP 2
ESTP 3	ESFP 5	ENFP 4	ENTP 7
ESTJ 5	ESFJ 1	ENFJ 3	ENTJ 5

Figure 2. ARUP employees MBTI results

The two ARUP Design Schools studied bring together junior ARUP staff nominated from all of Europe. The programme involved a 3 day workshop that introduces the groups to new design approaches and creative problem-solving through talks, seminars and group design projects. These two groups are made up of a range of ARUP associates and the two groups were tested for their MBTI type. Some initial observations from the group design activities are:

1. The E and I preference was clear in both seminar sessions and group work, with the E delegates more readily engaging with discussion and initiating group discussion and supportive commentary of activities during informal group work.
2. The 1st and 4th column delegates tended to generate more technical, problem solving approaches, such as drawing or constructing physical solutions that addressed a mechanical problem, such as a component that solved a specific problem.
3. The 2nd and 3rd column delegates tended to generate more social or human derived solutions as expected, so would approach the problems with the user issues first, and searching for a need or social value was a key factor.

3   DESIGN EDUCATION STUDIES-UK UNIVERSITIES BA, BSc & BEng COURSES

Courses were selected to span the design spectrum from recognised artistic orientated BA design to technical MEng courses from Five UK universities; Aston University, Buckinghamshire New University, Oxford Brookes University, Brunel University and The Arts University College at Bournemouth. Covering a range of courses to reflect the Industry case study areas including: BA Three Dimensional Design, BA Design & Interior Architecture, BSc Product Design, BEng Mechanical Engineering.

Table 6. BA Interior Architecture & Three Dimensional Design final year students from Brookes University & The Arts University College at Bournemouth, 2009

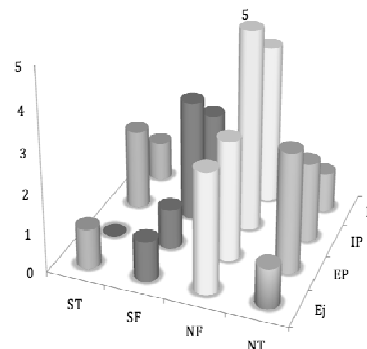| ISTJ 1	ISFJ 1	INFJ 4	INTJ 1
ISTP 2	ISFP 1	INFP 5	INTP2
ESTP 0	ESFP 1	ENFP 3	ENTP 3
ESTJ 1	ESFJ 1	ENFJ 3	ENTJ 1

Figure 3. BA Students MBTI results

Observations from the two BA (Hons) student courses:

1. Many students were in the 3rd column, as at ARUP where all the Product Design team were in this group.
2. Students had a strength in ideas generation and concept development, many of which are social or 'user' focused rather than technical, for example designing a child's learning toy or an improved social space for a day hospital.
3. Student's concepts and design development often included sketches with figures included even at early stages, highlighting a human focused approach.
4. Although a BA course with a focus on creative design, some students found the detail design and technical realization difficult and uncomfortable. Such as producing technical production drawings, materials specifications and fixing design detail.

Table 7. BEng Students from Brunel University
and Buckinghamshire New University 2009

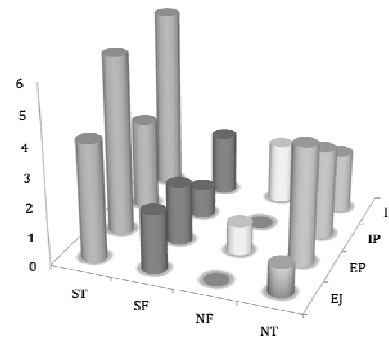| ISTJ 6	ISFJ 2	INFJ 2	INTJ 2
ISTP 3	ISFP 1	INFP 0	INTP 3
ESTP 6	ESFP 2	ENFP 1	ENTP 4
ESTJ 4	ESFJ 2	ENFJ 0	ENTJ 1

Figure 4. BEng Brunel & Buck's New
University students MBTI results

Table 8. BSc Product Design students from Aston
University 2010

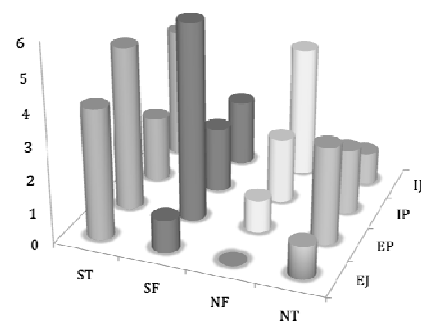| ISTJ 4	ISFJ 2	INFJ 4	INTJ 1
ISTP 2	ISFP 2	INFP 2	INTP 2
ESTP 5	ESFP 6	ENFP 1	ENTP 3
ESTJ 4	ESFJ 1	ENFJ 0	ENTJ 1

Figure 5. BSc Aston Students MBTI results

In their paper '*Using personality type differences to form engineering design teams*' Shen, Prior & White (2007)[11] highlight the value of design students understanding their character preference and suggest character type analysis can be used to select and assemble teams, and reinforce approaches rather than allow students to recognise differences and build skills to address weaknesses in their design approach. It can be seen that there are some cultural preferences to each course, which is not wholly unexpected. Many of the BEng students are in column 1 suggesting a predisposition for a logical 'cause and effect' approach with a strong preference for facts and data. The BA Design course has a number of students in columns 3 and 4, with a more abstract approach often looking for possibilities as a priority.

4   CONCLUSION

The design process requires a combination of approaches from open thinking, concept development and people focused consideration, through to time management and manufacturing technical details requiring a more focused approach. All are valuable and are often seen as different strengths, or preferences, in designers. ARUP uses its people in different ways at different stages of projects, with early concept generation often being lead by product designers and architects. This study has highlighted the need for a considered mix of personality types in a design and engineering teams, both in industry and education. It therefore calls into question the validity of design teams drawn from one university course alone, and by implication how any course can exist in a vacuum. Successful design teams, especially in the early stages of project selection and design development, rely on a mix of skills and approaches that rarely exist in one set of similar minded individuals. Those courses that can readily draw on other related disciplines and collaborate on cross-, multi- and inter-disciplinary briefs would therefore seem to be the way forward, and would make these graduates readily useful in the new ways that industry is working.

REFRENCES

[1] Jung, C. G. (1971) *Psychological types; In R. F.C. Hull. The collected works of Carl Gustav Jung* Princeton University Press.

[2] Myers, I.B. & McCauley, M, H. (1985) *Gifts Differing: Understanding Personality Type* Consulting Psychologists Press.

[3] Keirsey. D (1998) *Please Understand me II Temperament Character Intelligence* Nemesis.

[4] Mclening. C (2005) *Developing a new SPDS: Sustainable Product Design Specification tool.* Paper presented at Sustainable Innovation 2005, Farnham UK.

[5] Mclening. C & Buck. L (2008) *An Investigation into the Sustainable Approaches of the ARUP Associates Product Design Group*. Paper presented at Sustainable Innovation 2008, Malmo, Sweden.

[6] Kirby. L & Myers. D (1994) *Introduction to Type: A guide to understanding your results on the Myers-Briggs Type Indicator* Oxford Psychologist Press Ltd.

[7] Similarminds (2010) http//similarminds.com/jung.html{accessed 5.1.2010} Dym, C, L & Agogion, A (2005) *Engineering design thinking, teaching and learning* Journal of Engineering Education.

[8] Felder, R, M. Felder, G, N & Dietz, E, J. (2002) *The effects of Personality Type on Engineering Student Performance and Attitudes* Journal of Engineering Education.

[9] http://www.ARUP.com. ARUP associates company website.

[10] Shen. S, Prior, D & White, A (2007) *Using Personality Type Differences to Form Engineering Design Teams* Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre, Vol 2, No 2