THE ROLE OF PROSODY AND PERSONALITY TYPE ON EFFECTIVE TEAM FORMATION

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Effective communication has always remained one of the most crucial features of every successful project. Misinterpretation of instructions within large-scale projects can cost millions, not just in reworks, but also through compounded unnecessary delays in re-communicating messages among all teams in the supply chain. This paper discusses prosody and personality types and their roles within communication. Poor team formation has been noted to have a strong correlation with unsuccessful project communication. Prosody has an impact the exchange of information, but it is not widely researched or applied within the wider construction sector. The reviewed literature offers an insight into the effects that prosody and personality types have on communication and team cohesion. A mixed methods methodology is adopted in this study. Interviews with senior project and construction managers were conducted to test the importance of correct team formation. Utilising the Myers-Briggs Type Indicator (MBTI) and investigating the role that prosody must play in interpretation of communication, data from a quantitative pilot study highlights the need to understand the personalities behind the teams in advance in order to deliver a successful project and effective team. Data analysis shows the majority of those surveyed within the engineering discipline have Extraversion (E - 77%) and Judging (J - 77%) characteristics, yet this is the least common type among general population. The research offers discussion on finding unity between team formation and successful project communication.

Keywords: communication; Myers-Briggs; prosody; team-formation

INTRODUCTION

As a general topic, communication is a vast and widely published source of discussion, not just in the field of construction and engineering, but throughout psychology and the social sciences. Many sources (Dainty, *et al.,* 2006; Martin, *et al.,* 2014; Olanrewaju, *et al.,* 2017; Wu, *et al.,* 2017) single out poor communication as being the root of poor productivity and performance within projects. In general, the majority of the problems in the industry are caused by improper and ineffective communication (Gamil and Rahman, 2017). The wider AEC industry relies on effective delivery of information to function at the optimum level. There are many factors which influence the efficiency and effectiveness of communication and the transfer of knowledge and information within a team. These range from linguistics

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and the prosody effect, silent information (the absence of body sounds), personal constructs and personality types of the individuals involved, to bias and the role that the hierarchy must play on those encompassed within the wider project team. There is also an argument that even those who are not directly involved in conversation or direct contact still receive information, through overhearing and eavesdropping (Nilsen 1957), such as in a larger team on major projects.

This paper aims to develop discussion on the effects of prosody within communication and team formation questioning whether personality types and prosody are appropriately considered when creating effective teams for construction and engineering projects. This research is innovative as the level of understanding and knowledge about prosody and team formation is very limited within the engineering sector. Building on the work of Shen, *et al. (*2007) team formation is reliant on the effectiveness of individuals within the group communicating successfully together, and for this, personality constructs surely must be considered when initially forming the group. Defining communication with certainty is difficult as it has such a variety of contexts and can be considered multidimensional (Dainty, *et al.,* 2006) and intersubjective (Mortensen, 2017) and as Nilsen (1957) outlines that the meaning of the word is at once both clear and unclear. As research continues beyond engineering and into the social sciences, wider terms and forms of the same communication theme are expanded upon; Verbal and non-verbal communication, written, interpersonal and intercultural, mimicry and imitation, technological, didactic etc., the list is endless. Gamil and Rahman (2017) outline that good communication skills are essential to produce effective communication yet if the speaker lacks these, then poor communication may result.

LITERATURE REVIEW

Within the wider aspect of communication and the transfer of information lies the theory behind imitation and repetition, and how the successful transference of a message or material is in the replication and delivery. This can be classified as Meme Theory. Dawkins first penned this term as ‘meme’ in 1976 referring to his work on Darwin’s theory of evolution and studies on genetics. When something is imitated, it is passed on repeatedly and so can take on a life of its own (Blackmore, 1999) in a similar fashion to relaying information around a construction project. Ideas often mutate and evolve as they pass from one person to another. However, as outlined by Boyd and Richerson (2000), ideas do not pass intact from one to another and breakdowns in the accurate transmission of ideas, messages or instructions can occur because of differences in the personal background or culture of two individuals and can lead one person to create an incorrect assumption of what the other is attempting to convey.

Personality Type

It is important here to draw attention to the role that personality has on the effectiveness of communication. Within engineering, the need for teamwork and multiple forms of communication are the norm, yet project teams are formed by factors such as experience, role, availability and even location and not necessarily formed on personality strengths. These types of methods, although realistic, are potentially flawed as they do not specifically consider the strengths of the individuals involved and are not designed to get the best out of the team. The Myers-Briggs Type Indicator (MBTI) is a worldwide recognised personality testing tool used to determine the type of personality that an individual possesses. No other psychological testing

instrument has been subjected to as many tests of reliability and validity (Myers and McCauley, 1985) and the work of Kim, *et al. (*2013) demonstrated that the validity of the MBTI model has been widely recognised. Building on the Jung typology test, individuals' personality types are fixed into one of a number of categories (16). These rate from ISFP; Introvert, Sensitive, Feeling and Perceiving, to ENTJ; Extravert, iNtuitive, Thinking/Technical and Judging. Many studies suggest that the natural leaders are those with ENTJ traits, and the ESTJs are the administrators (Kroeger and Thuesen, 1992). The work of Shen *et al.,* (2007) has explored the process of forming engineering teams based on the MBTI instrument, however it is only within a research setting and does not provide any practical application beyond a learning environment. They outline how ISTJ and ESTJ types should not be paired together in the same team as a power struggle may develop, which could hinder the performance of the team as a unit, however, this is never qualified or expanded upon within their paper.

In parallel with the research of MBTI was the emergence of the Five-Factor Model (FFM), sometimes referred to as the 'Big five'. In contrast to the MBTI and its use of metrics to categorise subjects into 4x4 strict 'types', FFM uses five factors and provides a percentage weighting to each category. The categories of personalities are known by the acronym 'OCEAN', standing for Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. In comparison to MBTI, a person is given a weighting on each 'OCEAN' trait, so someone could be low in extraversion but is not categorised as being an introvert like they would be if the MBTI system was applied. To individuals from outside the discipline of psychology, personality can be defined by such terms as friendly and high strung (McCrae and John, 1992) rather than strictly those categorised within the FFM model.

The methods behind assessing individuals to determine their personality have been widely discussed and critiqued (Digman, 1990; McCrae and Costa, 1987) and a wide series of studies have examined the comprehensiveness of the model by joint analysis with alternative personality systems including MBTI, FFM and the Eysenck and Eysenck (1975) scales. The FFM is not a complete theory of personality (McCrae and John, 1992) and is not without its critics either, such as McAdams (1992) who suggests that it is not a theory of personality at all. McAdams alone has raised six criticisms of the FFM, with one critical question being "How is personality organised within the FFM?". This aligns with the queries of Funder (1983) who states that traits have no bearing on real social behaviour and can be laid to rest. However, the methods and its adoption in forming a general personality have been well adopted and used within the psychology discipline. Digman (1990) has concluded that the FFM has, as a minimum, provided us with a useful set of very broad dimensions that characterise individual differences, aligning with the criticism of Hough (1992) who viewed the description of personality as too coarse.

In order to appreciate how a well performing and efficient team can be created, it is necessary to understand the types of personalities that could form the team's spine. Knowing the traits of individuals within the team is key as there is the possibility that some individuals may be pre-determined for different roles (Madter, *et al.,* 2012). Appreciating that the individual is key, Carnevale and Carnevale (1994) identified the importance of understanding the individual and recommended the use of tools such as the MBTI or FFM. According to Bradley and Hebert (1997), ineffective teams may be the product of inappropriate team composition, and the ideal team should be diversified in the talents and knowledge of each member whilst still maintaining open communication. If each team member is given a role that best suits their skills and

knowledge, or their personality, then the team will perform to its maximum capability. Others (Shen, *et al.,* 2007) also argue that any personality type assessment method applied to understand and appreciate the members of the team is better than any of the alternative random selection methods, and there should be a balance of personality types within the team makeup. Mixing up personality types in the most effective way is a key approach to form a cohesive and well-functioning team. King (1989) wrote that the benefits of a well-functioning and successful team include increased internal motivation, greater task commitment, more resilience to stress and higher levels of performance. This also reflects the work of both Kroeger and Thuesen (1992) and Myers (1980) who both suggest that diversity of psychological types results in a successful group performance. Kroeger and Thuesen (1992) go further and make suggestions that too much diversity between types within a group may restrict the team's performance. They suggest that within the MBTI, the J/P difference is a key issue to the team success or failure, and they also highlight that an influence of too many J's is that they may not consider all the potential alternatives in a rush to stay on schedule (Kroeger and Thuesen in Bradley and Hebert, 1997).

Prosody

Within the realms of communication, interpretation of messages is exceptionally important, both in terms of the individual relaying an instruction or message, and those receiving it. How that message is delivered is key to the transfer of the information between the parties. Affecting this is the presence of prosody in the transaction. Prosody is defined as "the branch of knowledge which deals in the forms of metrical composition" or the pronunciation of words and versification (OED, 2018). In terms of communication, it is how the message could be delivered or versed that may cause miscommunication or misinterpretation between the parties involved in the exchange.

Communication and prosody have both been widely researched and analysed and in the past decade there appears to be a growing appreciation for the role of prosody. The way in which we deliver a sentence, the utterances used, the intonation melodies and rhythms all contribute to how that message can be received. These phonetic properties that mark emotional or physical states and individual characteristics are often known as paralinguistic features (Gibbon, 2016). Accents and other prosodic cues can sometimes change the intended meaning of a phrase without inherently meaning to purposefully do so. American English has more intonations on the end of the phrases, in general, than the English accent, and phrases that have a 'continuation rise' at the end, such as in many American and Australian accents, convey the impressions of there being more to come. This rising pitch at the end of a sentence also conveys that the sentence could be a question, which in fact it may not be. Hirschberg's research has shown that there is no single method a given speaker employs to convey a kind of meaning, and states categorically that there is certainly no single method all speakers use to convey meaning (Hirschberg, 2002). This demonstrates that every individual is different and may have a varied way of expressing their instructions and opinions which may not be interpreted as they originally intended. This also aligns with the MBTI studies.

Communication is not simply about transmitting but also receiving, including the knowledge that the transmission was understood in the way intended (Firth-Cozens, 2004). To deal with colleagues in a clear way, the technique of prosodic entrainment, also called alignment, adaptation coordination or priming, is one that could be utilised

in order to work within the variations with accents and sentence delivery. Prosodic entrainment is where one party attempts to replicate or mimic the others manner of speech in an effort to communicate on their level and avoid the wrong prosodic cues in their discourse. It is the phenomenon of conversational partners becoming more like each other in what they say, how they say it and other behavioural phenomena (Levitan, *et al.,* 2012), all to varying degrees of dialogue success. This is a heavily researched area not only for linguistics, but widely across the social sciences and human behavioural studies, yet not very well researched or published within the AEC disciplines. Chartrand and Bargh (1999) dubbed the term 'The Chameleon Effect' and they show that imitation of posture and behaviour led to an increased liking between dialogue participants as well as a smoother interaction. With a link to the Myers-Briggs studies (MBTI), they also discovered that more empathetic individuals exhibited a greater degree of mimicry than others (F/S types). When forming engineering teams this factor could be significant in ensuring clear communication throughout the project. By adopting this approach, it may result in clearer communication approaches and strategies as the recipient understands the phrasing and intonation in the desired way.

Implicit prosody

It may be argued that an alternative method of communication would be written instruction, thus alleviating the possibility of prosody 'interfering' with the intended message or communication. However, implicit prosody is the application of prosodic cues while reading. That 'voice in your head' that narrates the sentence that your eyes are focusing on is also forming its own interpretation of the sentence structure and perhaps affecting the message, instruction or communication that has been written. Inner speech mirrors the intonation patterns of external speech (Ashby and Clifton Jr, 2005). The work of Breen (2014) also argues that silent reading and the implied rhythms, phrasings, stresses and melodies can affect readers interpretation of the text. As outlined by Fodor, (2002) implicit prosody noticeably affects syntactic decisions. The idea that conveying a message or instruction in writing may be a clearer way of communicating is a noble one and as the work of Gross, *et al.,* (2013) has shown, prosodic reading has many communicative benefits. However, the simple fact that implicit prosody exists may be enough to scupper this attempt in clarity, as prosody is a universal feature in all languages (Endress and Hauser, 2010). A failing of the work of Gross was that they could not establish "with complete certainty" that a silent voice was in fact perceived by participants. It is however very difficult to manipulate sentence prosody in written text since the prosody of full utterances shows substantial optional variation, and experiments to determine if implicit prosody occurs focus on eye movements when reading. Ashby and Clifton Jr (2005) undertook experiments to determine whether the prosodic property of lexical stresses affected eye movements, as some words have varying fixation times and the eye is sensitive to word recognitions. Their results showed that the eye takes longer to read words with two stressed syllables, indicating that readers do indeed process stresses during silent reading.

Building on the rhythms and melodies of accents in the spoken word, implicit prosody has shown evidence of Auditory Perceptual Simulation (APS) which occurs where readers mentally simulate characteristics of the voices of the speaker who has written the text. The results of Zhou and Christianson (2016) demonstrated that even silent reading speeds were modulated corresponding to the speech rates of the control speakers. On multidisciplinary construction sites with many different cultural and

ethnic groups involved, this phenomenon could be a factor influencing written correspondence. Zhou and Christianson's work shows that readers had more negative attitudes towards the Indian-English speech than that of the American-English and with world-wide influences on major UK infrastructure projects this factor must be recognised.

METHODS

It is difficult to accept that a single research method is appropriate to all construction management research (Wing, *et al.,* 1998) leading this project to incorporate a mixed method approach, utilising both qualitative interviews and quantitative pilot study data for discussion. As this investigation is focusing on issues incorporating communication and personality types, a more qualitative approach is necessary. The outcomes of the pilot study would be segregated into various categories which may dictate the progression of the main research: (i) Stop - main study not feasible, (ii) Continue - modifications required and (iii) Continue without modifications (Thabane, *et al.,* 2010).

Previous studies around this topic have allowed for a mixed methods approach (MMR) such as the work of Olanrewaju, *et al. (*2017) and Wu, *et al. (*2017) where some elements of the research have been based on a cross-sectional survey questionnaire. The qualitative interview method crosscuts disciplines, fields and subject matters (Denzin and Lincoln, 2000) and is a situated activity that locates the researcher in the 'world' of their research topic.

Developing the knowledge of prosody in combination with existing studies (such as Shen, *et al.,* 2007) on MBTI and team formation may aid in filling the identified knowledge gap.

DATA COLLECTION

Quantitative data has been gathered from participants within engineering, construction, higher education and architecture sectors between 2019 and 2021. Undergraduate construction management students of were part of the data collected, beside qualitative interviews with management professionals within the wider industry. Participation was voluntary and the results were kept confidential. In this pilot study, no analysis was undertaken to segregate for gender or age, the respondents were simply split into professional and students. There are several studies which examine the MBTI type distribution among the general population (Ball, 2001; Wideman, 2002) and table 1 shows the results of the pilot study data against the general population. From the work of Cohen, *et al*., (2013) the most common personality type within the general population is ISFJ (13.8%).

Table 1: Pilot study data and general population personality types (MBTI)

	ENTJ	ESTJ	ISTJ	ENFJ	INFJ	Other
Professionals (n=20)	30%	20%	0%	15%	10%	25%
UG Students (n=37)	24.3%	16.2%	16.2%	8.1%	2.7%	32.5%
General Population (Cohen, *et al.,* 2013)	1.8%	8.7%	11.6%	2.4%	1.5%	74%

As defined in the table, the most common personality type within the construction industry is ENTJ, yet this is one of the least common for the general population. The candidates were all at management level and no trades or labour force were included.

The results of the qualitative interviews all showed a lack of awareness of the MBTI in principle. No application of this personality measuring method was used by any of the candidates when forming their own site or project teams. This was acknowledged as perhaps being a failure on their current practices, alongside the total lack of awareness of prosody and its effects on verbal and written communications and its potential impact within larger project teams. Candidates were senior construction and project managers from both contractors and consultancies.

To progress this research project, further in-depth quantitative analysis will need to be undertaken to break down the findings between gender, age and profession, along with a much larger sample size to allow for greater data frequency and stability.

DISCUSSION

The gathered data from the pilot study shows an above average saturation of 'E' and 'J' types within the AEC sector compared to general population. There is a visible comparison of personality types between the professionals and students as they are all from the wider engineering discipline. From initial qualitative research (interviews with project and construction managers), personality types are not considered when creating teams at any stage of a project. Some questioned were completely unaware of the MBTI type, yet others had heard of it and taken a test socially. All interviewed had no prior knowledge of FFM or the role that could play in aiding team formation, and when it was explained, no obvious benefit was determined. What is surprising in the current research, from initial qualitative interviews, is the lack of understanding among those in the industry about the theme of prosody or the beneficial role it may have within team formation along with approaches and techniques that could be adopted to benefit clear and explicit communication. Interestingly, prosody was a phenomenon that was not known about by any candidate within the pilot study ("never heard of it"). This could be because of a lack of knowledge about the social sciences among those in engineering or point to a gap in training and education. 'Chinese whispers' was the closest comparison that could be made to highlight how prosody affects communication within a team. Both project leaders and team members should be made aware of how prosody can affect the transmission of instructions and messages within a project team, especially in teams where there are multicultural and multinational individuals all delivering the same project.

MBTI appears to be the most practical and obvious tool for assessing and segregating personalities with a view to aid team formation. It provides an absolute 'type' of individual which can then be used to aid team formation and demographics. Based on the qualitative interviews the FFM does not allow enough clear options to determine a 'type' and it would be more difficult to categorise individuals into labels in order to fulfil their position within a team, in line with the findings of McAdams (1992). The research by Shen, *et al. (*2007) outlines the limitations of having too many similar types within the same group, as a power struggle between 'E' and 'J' types may develop. With such a saturation of these specific traits within the AEC sector, this needs to be explored and tested further. Could a battle for leadership between the same types (ENTJ's) have a detrimental effect on the effectiveness of a team and its internal communication, regardless of prosody? Shen, *et al. (*2007) declared that ISTJ and ESTJ should not be paired together, but could this be avoided considering the abundance of the T and J traits within those surveyed?

The work of Hautala (2006) concluded that there is a relationship between personality and leadership, as measured by the MBTI method. Clearly there is a correlation

between students who will eventually enter the AEC sector and those already within it. The overwhelming majority of participants display both Extravert (E) and Judging (J) characteristics (75% professionals, 71% students), suggesting the possibility of a correlational relationship to be investigated in future research. This is not too surprising considering the nature of the industry, where strengths towards the technical and judging personal characteristics would be an advantage.

Multilingual and multicultural construction and infrastructure sites may benefit from an increased awareness of prosody and the chameleon effect. Would an increased level of mimicry of accents, body language and even posture etc., result in a greater level of effective communication because of an enhanced strengthening of the relationship between the parties? Awareness of how individuals read an instruction and how their 'inner voice' could interpret the message could be an advantage in reducing potential errors in understanding or miscommunication. Understanding this phenomenon and engaging strategies to address it and raise awareness may aid in reducing any communication issues among larger project teams.

CONCLUSION

Communication is widely accepted to be one of the most important actors required to achieve construction project success. It comes in different forms e.g., explicit or implicit. This paper has presented an initial discussion on the effects of prosody within communication and team formation. As part of a wider research project, the current paper has explored a small sample of participants regarding personality types of team members and prosody. Initial findings show that personality type and prosody both affect communication, yet they are not very well known or understood within the construction industry, thus further supporting the rationale for such a study. Individuals within the AEC sector have a 'higher-than-average' level of 'E' and 'J' characteristics than the general population. Taking this into consideration when forming project teams to work together successfully may be a measure resulting in increased level of efficient communication. The pilot study was successful and is at the 'continue - modifications required' stage, which pushes the research towards more in-depth analysis. Current limitations on the project include small sample sizes but despite this, the initial findings point to gaps in knowledge about prosody within communication and its effects on team formation.

A longitudinal study from team formation to completion of projects can yield further insights. An initial contribution of this research is the initiation of a much-needed dialogue on the further improvement of team formation and communication in construction projects. Traditional team formation is always composed through familiarity and trades/skills, however, there is a possibility to approach this practice using personality types to enhance project success rates. Additional data collection and corresponding critical analysis is currently underway as earlier identified themes are further explored along with identifying any emerging concepts.

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