

## Predictors of Cultural Intelligence

What are the predictors of Cultural Intelligence and how do they range in importance?

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## Abstract

Knowledge about which factors, like personality traits, experiences and demography, and how these relate to cultural intelligence (CQ) is important in today's business world as we see trends of increasing globalization and cross-border communication and collaboration. Awareness of CQ has shown to be of high significance as it favors efficient adaptation and good communication skills in an intercultural setting, which can lead to; higher chances of completing international expatriate assignments successfully, more effective international negotiations, merging efficient and successful teams and produce better quality work. Naturally, businesses wish to employ people with high CQ. But how do you as a recruiter know what characteristics predicts positive CQ, and which characteristics the focus should be direct at to increase the chances of choosing the person with the most favorable combination of CQ traits? To help answer this, this paper explores what factors are associated with positively CQ and to what level of extent the various factors are related to CQ. Using data from 58 784 students and artificial intelligence for model prediction, the results show that the most important features to predict positive CQ are *Learning orientation*, *Home country* and *English language skills*. After dividing the measures into five categories (Competencies, Cultural Background, Personality, Demography, and Experiences), the traits related to Competencies were overall ranked as the most important to predict CQ. The findings of this research may broaden the understanding of CQ and what elements of CQ should be given more focus moving forward.

**Keywords:** cultural intelligence (CQ); CQ predictors; ranking of CQ traits; cross-cultural management; virtual teams; DataRobot; artificial intelligence

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## INTRODUCTION

There used to be a time when business was mostly domestic. However, the march of globalization made it impossible for a company to stay away from international business. Even the smallest companies have an international connection, be it by virtue of having international suppliers, or international customers, or international immigrant employees. Even if the contact is not face-to-face, but online. Research shows that up to 87% of white-collar workers in OECD countries at least occasionally complete projects with people from other cultures, often as members of global virtual teams (CultureWizard, 2018). Further, numerous studies have shown that Cultural Intelligence (CQ) is a strong predictor of performance in cross-cultural settings (for meta-analytic summaries, see Thomas Rockstuhl & Van Dyne, 2018; Schlaegel, Richter, & Taras, 2021). CQ is positively associated with the ability to complete international expatriate assignments, to be a more effective international negotiator, to be a more productive member of an international team and produce a better quality of work when working with people from other cultures. Naturally, businesses are interested in hiring people with high CQ, as well as offer training aimed at CQ development. The challenge is, it is not always possible to measure people's CQ and it is not always clear what kind of training contributes most to the development of CQ. So, the question then is, is it possible to predict based on demographics or other personal characteristics who has higher CQ? Do certain experiences or personality traits or other visible factors correlate with CQ? Likewise, if certain experiences or traits correlate with CQ, can/should CQ training focus on providing those kinds of experiences or developing those traits? For example, if it turns out that international travel improves CQ, perhaps companies should seek to hire people with more international experience or send people on trips to other countries as a way to develop CQ. Or perhaps it's the fluency in other languages that is associated with CQ? Or maybe it's simply the education level or age? In recruitment and hiring processes today, people are usually hired based on their experiences, but what if other traits and characteristics are more relevant and important to determine if a person is suitable for the job? Few previous studies on CQ have focused on ranking the relative importance of the factors related to CQ. This following research will do just that, with the hope to contribute to the understanding of CQ and what elements of CQ should be given more focus moving forward.

### Relevance

Not knowing what predicts CQ makes it difficult to recruit and select people with high CQ. This study seeks to fill this gap. The goal of the present study is to conduct a broad-range exploration of predictors/correlates of CQ. Using a large international sample and using big-data mining algorithms, over 100 different demographic and personal characteristics and traits are considered in the hope of identifying reliable predictors of high CQ. This task is deliberately approached with no a-priory theory or expectations and with openness to discovering any and every predictor of CQ, even if the relationship is counterintuitive. For example, there is no reason to believe that men vs. women, or if older vs. younger people, or people from certain countries have a higher CQ. However, if the analyzes reveal that indeed any of these factors are valid and reliable predictors of CQ, it is reasonable to believe it would be a useful discovery that will serve businesses well, even if the exact nature of the relationship will remain unclear.

### Proceeding

This paper has the following outline: First, CQ will be defined, followed by a literature review of previous findings from the research. Second, the methodological approval is outlined including descriptions of the dataset from the X-Culture Project as well as descriptions of the analyses tool DataRobot. Continuing, results are discussed, highlighting the findings of this research of what factors are correlated with CQ. A discussion part of the findings will follow, and lastly a discussion addressing practical implications and limitations and further research will be presented.

## **LITTERATURE REVIEW**

### Definition of CQ

The construct of cultural intelligence has been labeled CQ and refers to a parson's capability to adapt effectively in a new cross-cultural environment (Earley & Ang, 2003; D. Thomas & Inkson, 2004). It focuses on the person's ability to adjust to the new and diverse cultural setting, the level of efficiency of the interaction (Ng & Earley, 2006) and how well the cross-cultural interaction is understood and transmitted (Earley, 2002; Sharma & Mulka, 1993). According to (Ng & Earley, 2006, p. 10) CQ is a "culture-free construct that applies across specific cultural circumstances". In this lays the understanding that CQ is not about the capability to function effectively in one specific culture, rather it reflects a person's ability to

effectively and successfully adjust to a variety of different cultural environments (Earley & Ang, 2003). The meaning of CQ is a relevant term that also depends on the specific cultural- and ecological setting whereas understanding these culturally bound behavior and traditions reflect high CQ (Berry, 1976; Sternberg, 2004).

### *The importance of CQ*

Through the years, the importance of CQ has been given more focus, especially in business related contexts. It has been highlighted that even though "...some workers may never work outside their country of citizenship, many will interact with customers, clients, suppliers, and co-workers who are themselves outside their home country" (Crowne, 2008, p. 396). The construct has through previous empirical research been suggested to explain and predict attitudes and performance, organizational behaviors and expatriation intern, (Richter, Schlaegel, Bakel, & Engle, 2020), as well as cross-cultural adjustment, (Huff, Song, & Gresch, 2014) cultural effectiveness, work satisfaction, negotiation performance (Lee, Veasna, & Sukoco, 2014) and job performance (Soon Ang et al., 2007). A recent metanalyses by Schlaegel, Richter, and Taras (2017) used data from 110 studies to demonstrate that CQ explains a high degree of variance in adjustment to new work and cultural environments, job satisfaction at global assignments, job performance and leadership effectiveness. On a similar note, Thomas Rockstuhl and Van Dyne (2018) reviewed 167 studies using meta-analyses and in tune with the research by Schlaegel et al. (2017), their findings suggested that CQ plays a significant part in adjustment to new culturally settings, and it affects tasks performance and judgement and decision making in intercultural environments. Furthermore, CQ is not only important in business contexts. Showing high CQ is also highly important in general to conduct successful cross-cultural interactions with people in numerus different settings, where people have different cultural backgrounds. Moreover, public debates voicing opinions on "immigrant crises" and "increasing anti-immigrant sentiments" have been highly discussed topics in the social and political climate recent years (Taras, 2020). Children born from foreign parents are also rising on a higher level than ever before, and the need for sensitivity and cultural awareness, as well as the ability to adapt to new settings, engage civil in a cross-cultural discussions and show ability to be effective in settings with culturally diverse other are greater than ever (Taras, 2020).

### Conceptualization of CQ

A long history of intelligence research is what has resulted in the conceptualization of CQ. The research suggest that intelligence is multifaced and connected to various traits within a person. This conceptualization of intelligence and that it has to be seen in relation to: the biology, the motivation, the behaviors, and cognition was first introduced by Detterman and Sternberg (1986) and the CQ model by Earley and Ang (2003) is based on this research. The CQ construct has been conceptualized in two ways, first by Earley and Ang (2003) followed by D. C. Thomas et al. (2008). Both conceptualizations are based on intelligence theories and view CQ as a multifaceted construct (Detterman & Sternberg, 1986; Gardner, 2011; Sternberg, 1997). Both agree that CQ should be distinguished from emotional- (Salovey & Mayer, 1990) and social intelligence (Kihlstrom & Cantor, 2000). These skills might give individuals an advantage in one specific culture (Cartwright & Pappas, 2008), but they might be less effective in other cultures where other norms and behavior are favored. Both constructs (Earley & Ang, 2003; D. C. Thomas et al., 2008) agree that cultural intelligence applies explicitly to more than one culture.

There are also articles criticizing the concept and capitalizations of CQ. Blasco, Feldt, and Jakobsen (2012) critique the concept of CQ from a semiotic perspective and reflect on the assumptions that (1) that CQ exist, (2) that misunderstandings and conflicts are contradictory to CQ, and (3) that CQ involves a “cultural” dimension. They illustrate the need to focus more on context and motivation to determine CQ, especially in business purposes and when researching the role experience in cultural learning processes. They highlight the importance of being cautious in assuming that all human skills can be trained, giving examples of short-term interventions.

### Models of CQ

#### *The Four-Factor Model of Cultural Intelligence*

The original construct introduced by Earley and Ang (2003), consisted of three factors, but some year later Soon Ang et al. (2007) separated the metacognitive and cognitive dimensions into two factors. Individuals with high CQ are able to well combine the use of all four (Soon Ang, Rockstuhl, & Tan, 2015; Soon Ang et al., 2007; Earley & Mosakowski, 2004; Van Dyne, Ang, & Tan, 2016). The four factors are the following: metacognition CQ, cognition CQ, motivation CQ and behavior CQ, and the model is referred to in the literature as

“The Four-Factor Model” (Soon Ang, Van Dyne, & Koh, 2006). An explanation of the model will follow. See Figure 1 for demonstration of the model.

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*Metacognitive CQ:* Metacognitive CQ refers to an individual’s mental capability to process information and understand cultural knowledge (Earley & Ang, 2003). It also includes the ability to read other peoples’ emotions, goals, motives and external stimuli (D. C. Thomas et al., 2008). To communicate high CQ the individual must show skills of flexibility in their self-concept and be able to integrate new dimensions into their self-concept (Earley & Ang, 2003; Thomas Rockstuhl, Hong, Ng, Ang, & Chiu, 2010).

In the literature today, the dimension of cultural metacognition has been claimed to be one of the main contributions in the CQ concept, but some mean that this claim is overstated. In an article by Blasco et al. (2012) the concept of CQ is critiqued by shedding light on the importance to be cautious in assuming that all human attributes can be learned by training for business purposes, among others, through short-term interventions. As the title of the article reads “If only cultural chameleons could fly too...”, teaching someone how to adapt to new context might be just as hard as training them to fly, and one should not take for granted the limits of development of personal attributes.

*Cognitive CQ:* Cognitive CQ refers to an individual’s knowledge about cultural differences and cultures in general. It involves the person’s general knowledge about the different structures of a culture, and it takes into consideration knowledge learned from experience and education including specific standards, traditions and conventions, covering common aspects of society as well as cultural distinctions (Soon Ang et al., 2006; Ng & Earley, 2006; Thomas Rockstuhl et al., 2010).

A study by Thomas Rockstuhl et al. (2010) explains the cognitive and behavioral variations across cultures. They do so by referring to how neurological underpinnings can be used to understand and explain variations across cultures. By integrating research on behavioral and neuroscience together with research on CQ, one can better understand how people can become better at “bridging cultures”. This extended awareness of cultural variations is crucial for education in general and also to develop efficient leaders, since when you have a “culturally intelligent brain” a person can better function efficiently in a multicultural setting (Earley & Ang, 2003). Also, research by Bird, Oddou, and Harris Bond (2020) used cognitive behavior

theory when explaining various approaches to develop competencies favorable for intercultural settings. With basis in the context of higher education they outlined how experiences can be transferred into learning by using *concrete experiences* (doing/having an experience), *reflective observation* (thinking back on the experience and reflect), *abstract conceptualization* (seeing the experience in a broader context and conclude based on inter-related abstract variables how it was), and *active experimentation* (testing the conclusions).

*Motivational CQ:* The motivational factor of CQ refers to an individual's interest in gaining knowledge and interacting in cross-cultural contexts (Soon Ang et al., 2006). This facet of CQ consists of three primary motivators: enhancement, or the desire to feel good about oneself; development, or the desire to question and develop oneself; and consistency, also known as the desire for predictability and continuity in one's existence (Soon Ang et al., 2006; Earley & Ang, 2003).

In the literature, Richter, Martin, Hansen, Taras, and Alon (2021) performed a study using data from the X-Culture Project, including samples from 3531 individuals who worked in 822 global virtual teams. According to the findings of their research, the average motivational CQ of the team is a necessary requirement for high levels of social integration and success. Furthermore, an improvement in the team's average motivational CQ can improve a global virtual team's social integration and efficiency. Also, leader's motivational CQ level was found to have a positive and significant impact on performance and adjustment. Results show that the greater the motivational CQ a leader has, the stronger social integration the team will have, which lead to better team performance.

*Behavior CQ:* Lastly we have the behavior factor of CQ (Earley & Mosakowski, 2004). This involves the capacity of an individual to demonstrate acceptable verbal and non-verbal behavior while communicating with someone from a diverse cultural context (Soon Ang et al., 2006; Ng & Earley, 2006). In general it refers to a person's ability to communicate well with diverse others, behaving appropriately according to the setting, and recognize what behavior is favored and appreciated (D. C. Thomas et al., 2008). In the same study by Thomas Rockstuhl et al. (2010), it is stated that to bridge cultural differences efficiently it is not enough to only possess the understanding of how people in various cultures behave and think differently. Further they explain that the concept of CQ can be used as a framework to understand intercultural perspectives, but one should also include knowledge of neurological processes of the individual to fully understand why some people are more effective than others in multicultural settings.



These four factors together make a framework to describe the domain that is cultural capabilities. A new aspect of CQ referred to as “biological foundations” was not included in the initial conceptualization of CQ, but recent work within the field has embraced biological foundations of CQ as a factor influencing an individual’s CQ (Thomas Rockstuhl et al., 2010). See Figure 2 for a summary of CQ facets based on conceptualization by Earley and Ang (2003) and D. C. Thomas et al. (2008).

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### *The Cultural Intelligence Scale (CQS)*

“The Cultural Intelligence Scale” (CQS) was established by Soon Ang, Van Dyne, and Koh (2008) and is based on Earley and Ang (2003) and their conceptualization of CQ. The scale is a 20-item self-reported survey that can be used to measure CQ level. According to Thomas et al. (2015), the survey has limitations when it comes to incremental validity, since it is observed to be similar to other instruments measuring intercultural effectiveness. In addition, the CQS does not account for the interaction of its dimensions, nor does it determine how each factor is aggregated or how the overall result refers to particular outcomes. As a result, the measure is not as multidimensional as the construct, but rather consists of four aggregated facets that do not represent the nature of the construct (D. C. Thomas et al., 2015).

Thomas et al. (2015) reflect on the nature of the instrument and its possibility to reflect bias results that could give wrongly interpretations of a person’s CQ. Because current CQ measurement tools are based on self-evaluation measures, real and perceived cultural knowledge differ (Alon, Boulanger, Meyers, & Taras, 2016). The CQS scale by Ang et al. (2007) has some limitations, among others that it is challenging to compare it in a good way across various cultures and countries. Different cultural settings and variation of country context can influence how the questions are understood, and therefore limit the scale as a tool for cross-cultural assessment. It is therefore suggested that the sample measures should be adapted to the different cultural settings to better the generalizability of the scale (Schlägel & Sarstedt, 2016).

### *The Short-form Cultural Intelligence Scale (SFCQ)*

In 2015, Thomas et al. introduced an alternative measure for CQ, which considers effectiveness in an intercultural situation using a multifaceted instrument based on the three facets: *cultural- knowledge, skills* and *metacognition*. The scale, named “The Short-form Cultural Intelligence Scale” (SFCQ) measures CQ across different languages and cultures and relates to emotional intelligence and personality, as well as predicting factors like cross-cultural adaptation, international work and progress in multicultural interactions (D. C. Thomas et al., 2015).

Both the CQS scale and the SFCO instrument are good options to predict general CQ, however in business-related settings, they have some shortcomings in regard to predictive power and psychometric properties. “The Business Cultural Intelligence Quotient” (BCIQ) by Alon et al. (2016) developed a solution to this problem by introducing a new way to assess CQ directed specifically to business-related settings.

### *The Business Cultural Intelligence Quotient (BCIQ)*

The instrument of “Business Cultural Intelligence Quotient” (BCIQ) specializes in measuring CQ in business context and is developed to predict long-term success in other cultures on the basis of the CQ level (Alon et al., 2016). The instrument combines level of CQ with established predictors, such as the number of languages spoken and the degree of cultural distance to predict the variable measured. The BCIQ addresses the limitations regarding CQ theory cited in the literature by including culture-specific questions and behavior that reflect cultural breadth and fully capture all CQ aspects (Alon et al., 2016).

By including these questions, the personality predictor of openness, also known as Emotional Intelligence (EQ) is exceeded, in addition to being transferrable to other CQ factors that can be measured with cultural training, such as self-efficiency and cross-cultural adaptability (Alon et al., 2016). The measurement of BCIQ also considers cognitive features and observable independent variables that are correlated with cross-cultural performance. The final score provided after using BCIQ includes affective and behavioral components in addition to knowledge. Factors like psychological wellbeing, the development of cultural-appropriate skills and the ability to make attributes that are culturally accurate are also measured through CQ measures (Alon et al., 2016).

### *The Big Five Model (OCEAN model)*

“The Big Five Model” introduced by Ang et al. (2006) is a model that uses personality traits to predict CQ. Researchers have agreed that this is one of the most dependable tools of categorization to classify characteristics of personality, in addition to predict work behavior in different time span, cultures and context in assignments overseas (Soon Ang et al., 2006). Following is an explanation of the five personality traits; *openness*, *extraversion*, *conscientiousness*, *agreeableness*, and *emotional stability* and how they are referred to in the literature.

*Openness*: The Big Five personality trait of openness was described by McCrae and Costa (1987) as being capable of displaying creativity and intuition, and that people with a high degree of openness appear to have a wide variety of interests. Moreover, people high in openness are usually experience seeking (McCrae, 1993), have thin boundaries (Galvin, 1990; Hicks, Bautista, & Hicks, 1999; McCrae, 1993), and show strong intellectual flexibility and engagement (McCrae & Costa Jr, 1997). In a study by Depaula et al. (2016) 400 Argentinian military students participated with the aim to research the factor of openness in relation to CQ. The findings showed that openness is a positive predictor of students' general CQ, and that the frequency of social intelligence positively predicts CQ even more than other predictors that were part of the analytical model. Another study by Presbitero (2016) demonstrate how personality traits of openness to experience is positively related to all four factors of CQ, highlighting the relevance of CQ as an intercultural measurement for virtual cross-cultural interactions. Same result was also found by Soon Ang et al. (2006).

*Extraversion*: Individuals with a high level of extraversion are typically very social, assertive, active, brave, lively, adventurous, and expressive and known to be talkative, spontaneous, self-confident, and outgoing (Barrick, Stewart, & Piotrowski, 2002; Goldberg, 1992). Caligiuri (2000) stated that extraverted individuals can effectively adapt and learn the social culture of the host country, something that leads to better performance when faced with different settings. In the literature one can find several examples of studies related to the connection between CQ and extraversion. In study by Soon Ang et al. (2006) data from 338 business undergrads from a university in Singapore were collected. With the use of hierarchical regression analysis, they studied relationships between the Four-Factor Model (metacognition CQ, motivational CQ, behavior CQ and cognitive CQ) and the Big-Five Model, and results showed connection between extraversion and motivational CQ, behavioral CQ and cognitive CQ. On a similar note, Presbitero (2016) researched among others the personality traits

extraversion and how it relates to the four factors of CQ. The result of the two-study research with data from approximately 500 employees at a call center showed that CQ is significant and relates positive to extraversion.

*Conscientiousness:* Individuals high in conscientiousness are described to be dependable (reliable, responsible and careful), industrious (energetic, hardworking, persistent and strive to reach achievements), and efficient (punctual, planful and disciplined) (Soon Ang et al., 2006). They are likely to take the initiative in problem-solving situations and are methodical and precise in their work (Barrick et al., 2002). Research by Barrick, Mount, and Strauss (1993) shows that people who are conscientious show better performance because their purposeful, planful and organics approach often leads them to set ambitious goals. In the same study by Soon Ang et al. (2006), results showed a significant link between conscientiousness and metacognitive CQ. Another study by P. Caligiuri (2006) studied global leadership by collecting data through survey of leaders from European and North American firms. The result showed that a successful worker possesses a numerous set of skills, knowledge, personal characteristics, and abilities, with high level of conscientiousness being one of them.

*Agreeableness:* The characteristics of a person high in agreeableness are friendly behaviors in general, good-natured, cooperate well, soft-hearted, helpful, flexible, courteous and nonhostile. Furthermore, agreeable people are interpreted as warm, nurturing, likable and supportive on an emotional scale. People with high level of agreeableness show higher level of interpersonal competence in work related settings (Witt, Burke, Barrick, & Mount, 2002). Witt et al. (2002) found this connection when researching seven independent samples of workers across various occupations. By the use of hierarchical regression, results showed that the individuals low in agreeableness received lower ratings of job performance compared to the workers with high score related to agreeableness. Also, the study by Soon Ang et al. (2006) found a link between agreeableness and behavioral CQ, which illustrates the importance of interpersonal sensitivity and how this effect the efficiency of interactions and job success. Furthermore, people low in agreeableness are described as oppositional, cold and/or hostile in their actions towards others (Carver & Scheier, 2000). To resolve social conflicts, people low in agreeableness often use power. This way of dealing with conflict is less common in individuals high in agreeableness and research also show that people low in agreeableness more often get into conflict situations (Asendorpf & Wilpers, 1998; Graziano, Jensen-Campbell, & Hair, 1996).

*Emotional Stability (and Neuroticism):* Calm and even-tempered are characteristics generally possessed by people high in emotional stability (Ones & Viswesvaran, 1997).

Moreover, emotionally stable people rarely express a lot of emotions and have a tendency to be less depressed, angry, anxious, worried, embarrassed and insecure. The opposite of emotional stability is referred to as neuroticism. Individuals high on this personality trait tend to monitor themselves in a more detailed way and are highly self-conscious in addition to reflecting excitable behaviors (Barrick & Mount, 1991). Several studies have looked into the effects of this personality trait in cross-cultural adjustment. To mention some, the study by Soon Ang et al. (2006) found a positive relation between behavioral CQ and emotional stability. The findings indicate that people with high level of emotional stability are better at dealing with novel and unfamiliar multicultural situations and reflect behavior that produce efficient and comfortable cross-cultural interactions for the people interacted with. Another study by Huff et al. (2014) researched a group of 154 self-initiated expatriates working in Japan. With the use of questioners and regression analyses, the study found neuroticism to be significant for general adjustment, and especially interaction adjustment.

### CQ and its many names

Concepts related to CQ go under the umbrella term “cultural competences”. Leung et al. (2014) were able to identify more than 300 concepts related to CQ as well as 30 cultural competence models. Words like “*intercultural worldviews and attitudes*”, “*intercultural personality traits*” and “*intercultural capabilities*” are some examples of terms explaining cultural competencies that were all included in the broad range of 300 concepts. The skills, knowledge and competencies that lead to good and effective communication in intercultural settings have been labeled by some researchers as “*cultural intelligence*” (Earley & Ang, 2003; D. C. Thomas et al., 2008), while other explain this construct as “*intercultural worldviews and attitudes*” (Booth, 2014), “*intercultural capabilities*” (Leung et al., 2014), “*cross-cultural competencies*” (Johnson, Lenartowicz, & Apud, 2006), “*intercultural competencies*” (Witte & Harden, 2011), “*global competencies*” (Bird, Osland, & Lane, 2004) and “*global mindset*” (Lovvorn & Chen, 2011) to mention some. These concepts have a longer research history in the field of management, business, psychology, communication studies and education (Yari, Lankut, Alon, & Richter, 2020). Researchers within the various fields studied the phenomenon independently and came up with a variety of names to explain different variables and their outcomes related to among others global leadership, expatriation intention, negotiation performance and job. The many names and lack of common terminology can lead to confusion and hamper collaboration across the various fields of research. Yari et al. (2020) recognized

this problem and state that valuable and further insight on CQ can be gained if able to integrate all related theories and empirical studies on the topic.

### Measurements of CQ

Diverse methods are used to measure CQ and one can categorize them into *self-reports*, *observer-reports* and *performance-based measures* (Soon Ang et al., 2015). These are well used measures to address CQ, but one should also be aware of their limitations (Taras, 2020).

#### *Self-reports*

To measure CQ using the method of self-reports, a list of statements related to several dimensions of CQ is presented to the respondents (for example “I am open to new ideas, people, and cultures”). The respondent answers the questions by rating the level of agreement to each statement presented. This type of measurement of CQ considers the individual’s perceived capability and therefor reflect the person’s self-efficacy in cultural intelligence. Within empirical research today, the most used measure is “The 20-item four-factor Cultural Intelligence Scale” (CQS) (Ang et al., 2007). The CQS include factors to measure both the dept of cross-culture intelligence as well as structure validity which is considered highly positive for the quality of the model (Van de Vijver & Leung, 2009). Leung et al. (2014) describe that the model generalizes through (1) several student and executive samples; (2) repeated analyses for up to 4-month intervals; (3) multiple regions; (4) diverse cultural samples; or (5) people involved in multicultural teams. Even so, the reliance on subjective self-report is stated to have the biggest limitation of the excising CQ instruments, especially when used for recruitment and selection purposes or for monitoring performance and learning. In these situations, the person taking the test might be motivated to manipulate the test score to get better results, and knowing what answers give the highest CQ score is often no hard to guess (Taras, 2020).

#### *Observer-Reports*

Information about a person’s level of CQ can be gathered using Observer-reports. Such reports collect information and reflections about how cultural CQ is perceived from an outside point of view. Reports based on observations from for example supervisors, peers, friends and colleges regarding how cultural intelligent a person is perceived by them is the outcome using this method (Soon Ang et al., 2015). “The 20 item- Cultural Intelligence Scale” by Van Dyne

et al (2008) is an observer-based measure of CQ. The study of Tavoletti, Stephens, and Dong (2019) uses this measure of CQ when they studied global virtual teams and the impact of peer evaluation on team effort, productivity, motivation and performance. Results showed that when peer assessments are used in global virtual teams during the project, teams demonstrate: higher levels of team effort; lower levels of average efficiency and motivation; and no consistent signs of increased team performance (Tavoletti et al., 2019).

### *Performance-based reports*

To measure CQ, Ang et al. (2014) developed an *intercultural judgement test* (iSJT). This test measures CQ by introducing participants to a variety of questions related to work situations. The participant is asked how they would most likely respond if faced with the situation in the scenario. The purpose of this is to see how effective the person would respond and resolve the given situation. Using this method provides broad and more detailed information about the CQ level of a person since it also includes measures of nonverbal language in addition to real-life scenarios. In a study by Rockstuhl et al. (2013), task performance for professional offshore workers from the Philippines was predicted using the iSJT method. Furthermore, in a study by Rockstuhl et al. (2015) international organization citizenship behavior (OCB) as well as peer-rated task performance in multicultural teams was predicted using iSJT. On a more critical note, Thomas Rockstuhl et al. (2015) argue that more focus in the iSJT test should be given to how people perceive and interpret situations. Existing tests focus mainly on interpreting the effectiveness of different response options (i.e., judgement response) and it is suggested that explicit assessment in relation to situational judgement should be added to the iSJTs and that this will provide important information beyond what is available when using response judgement tests (Thomas Rockstuhl et al., 2015).

### *Antecedent of CQ*

CQ is theorized to evolve through awareness of multiple cultural social environments (Earley and Ang, 2003) and from experience with culturally diverse people (Thomas et al. 2008). It is therefore believed to result naturally through exposure to other cultures as well as from educational interventions. This assumption, however, has been brought into question, and it is still unclear how a person develops or increases CQ (Soon Ang et al., 2015). Previous research on CQ and its antecedents have mainly focused on international experience/ cultural exposure, education/ training to develop CQ and personality traits/individual differences (Soon

Ang et al., 2015). In recent years however, an increased interest in gaining knowledge about the elements that can influence the *performance* in multicultural work teams, and determine if there is a positive or negative link between cultural diversity and performance in global virtual teams (Derven, 2016; Richter et al., 2021) can be observed.

Since personality traits are broad individual differences that does not change significantly over time and affect how individuals experience situations and behave, it is stated that personality traits can affect the development of CQ. Furthermore, CQ has through a broad body of research shown to be predicted by multiple factors. Bird (2013) characterized CQ competencies as *personality traits, physical attributes, cognitive orientations, motivations, attitudes, behaviors and knowledge* and in the intercultural litterateur competencies are often divided into three groups - *affective, cognitive, and behavioral CQ* (Bennett, 2008). With based in previous grouping in the literature, the measures included in this research have been divided into five overall categories: Competences, Personality, Experiences, Demographic and Cultural Background. The intention for this grouping is to provide a more structured overview of facets related to CQ from a broader perspective. An illustration of the five categories can be seen in Figure 3.

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## METHODOLOGY

### Sample

This study used the X-Culture database (X-Culture, n.d.-a) to explore the predictors. This data is collected from participants of the X-Culture Project, an international large-scale business competition for students that lasts one semester. The sample consist of data collected during several years from participants in the project, resulting in data from a total of 58 784 students from 160 different countries. During the project the participants were given real-life international business challenges from a dozen of companies. The students were placed in global virtual teams of up to seven team members from different countries. During the active face of the project (two months) the students in the given group communicated almost daily while they worked on the challenge given and together developed and presented a solution. The data used in this study were collected during 2018 - 2020. The X-Culture data has been



used for several research projects recent years and many ongoing studies are being conducted. The data were first ready for use in 2012. See Appendix 1 for a summary list of some of the most recent studies published using X-Culture data.

Due to the measurement tool (DataRobot) utilizing artificial intelligence, all data, including the samples with incomplete team answers due to missing responses could be included in the analysis. Missing values were no issue since DataRobot is specialized to handle such values and collect them in a group labeled as “missing values”. In the given sample the average age was 23 years, 48% were male and with individuals from 160 different countries (majority from the USA) this sample of data were nationally diverse. See Table 1 for a description of the variables used.

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Insert Table 1 here  
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### Measures

Surveys were used to collect data from the contestants before, during and after the X-Culture Project. The measures used in the survey were drawn from or adapted from the literature (X-Culture, n.d.-b). Since English was the project's working language, the surveys were presented in English, and all students were checked for English proficiency before being assigned to teams. The data were collected between 2018 - 2020 and consist of questions from multiple different questioners. Therefor the respondent rate for the different questions varies, in addition to some of the questions being moderated or changed during the years.

### *Total CQ score*

In the X-Culture dataset, total CQ (M= 4.23, SD= 0.89, MED= 4.10) (see Table 2) was measured using a self-report survey based on the “Cultural Intelligence Scale” (CQS) by Ang et al. (2007). The questions were directed in a way to measure the level of *behavioral CQ*, *cognitive CQ*, *metacognitive CQ* and *motivational CQ*. The total CQ score measured using the Ang et al. (2007) framework was used as the target variable for the measures conducted in this research. This because it is one of the most trusted and cited measurements tools of CQ (Van Dyne, Ang, & Koh, 2008; Yari et al., 2020). To rate the level of *behavioral CQ* participants were asked questions related to non-verbal and verbal behaviors. Vocal gestures and non-verbal signals can affect meaning, emphasis and other aspects of social behavior (Argyle, 1972)

and is therefore relevant to CQ. The questions were measured using seven items (e.g., “I alter my facial expressions when a cross-cultural interaction requires it” and “I change my nonverbal behavior when a cross-cultural situation requires it”).

*Cognitive CQ* (cultural knowledge) was measured with seven item scale (e.g., “I know the arts and crafts of other cultures” and “I know the cultural values and religious beliefs of other cultures”). To measure *metacognitive CQ* (participants process and understanding of cultural knowledge) a seven-item scale was used (e.g., “I check the accuracy of my cultural knowledge as I interact with people from different cultures” and “I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me”).

Lastly, to determine the degree of *motivational CQ*, a seven-item scale was used (e.g., “I am sure I can deal with the stresses of adjusting to a culture that is new to me” and “I enjoy interacting with people from different cultures”). The participants were asked to rate their level of agreement to each question on a scale from one to seven, 1=strongly disagree to 7= strongly agree. Based on the samples collected a variable was conducted, measuring the total score of all four categories.

Further, measures have been divided into five categories: Demography, Experiences, Competencies, Personality, and Cultural Background. Figure 3 gives a demonstration of this, as well as Table 2 provides an overview of the descriptive statistics for each individual variable.

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Insert Table 2 here  
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### *Demography*

The variables *age*, *gender* and *level of education* can be described as demographic variables of measure (Pollak & Wales, 1981). *Age* (M= 22, SD=4.58 MED= 22) was measured in years and *gender* in male/female (male=48% and female= 52%). Demographic experience in regard to *level of education* were measured using direct questions. This is a well-known measurement technique within qualitative methods (Eriksson & Kovalainen, 2015). *Level of education* (M= 1.27, SD= 0.54, MED=1) was measured on a scale from one to six, 1= Undergraduate, 2= MBA and other Master's, 3= EMBA, 4= Mix, 5= Professional and 6= Other.

## *Experiences*

Direct questions were used to measure *work experience*, *management experience*, and *job status at the time (work now)*. *Work experience* (M= 3.52, SD= 1.74 MED= 4) was measured using a 7-point scale ranging from 1=never had a job to 7= more than 10 years' experience. Empirical studies emphasis on the use of 5-item and 7-item scale concluding that this scale format improve reliability and validity compared to those with fewer scale-points (Dawes, 2008). Moreover, using a five-point scale the participants were asked if they had *managerial experience* (M= 1.59, SD= 0.94, MED= 1). The scale anchored at 1= no experience, to 5= owning own business. Lastly, the participants were asked if they were *currently working in addition to being a student (work now)* (M= 1.88, SD= 1.06, MED= 2). A five-item scale was used (e.g., "No, I am a full-time student, not working at the moment" and "Yes, I study and have a part-time job (up to 20 hours/week)". Participants were also asked the following "Have you ever been asked to live abroad for work?", which was measured using direct "yes" or "no" answer. Furthermore, the *total of countries* (M= 1.41, SD= 0.75, MED= 1) the participant had lived in was measured by asking the following question: "In how many different countries have you lived for more than six months other than your country of origin?" and the scale was ranged from 1= one country to 5+= more than five countries. Lastly the participants were asked to rate their *level of satisfaction with their last international experience* (M= 3.47, SD= 0.67, MED= 4). Using a scale from 1= very unsatisfied to 4= very satisfied a variable was conducted.

## *Competencies*

"The Cultural Intelligence Quotient instrument" (BCIQ) developed by Alon et al. (2016) was one of several measures used to collect data on *level of knowledge* (M= 25.79 , SD= 22.04, MED=15.56) during the X-Culture Project. The cross-cultural instrument is a reliable tool to measure CQ (Alon et al., 2016; Velez-Calle, Roman-Calderon, & Robledo-Ardila, 2018). The data were collected in week 5 of the project. The questions asked were true/false questions about demographics and cultural measures (e.g., "Swahili is used as a lingua franca in much of South East Africa" and "Victoria Falls are the largest falls in the world located in Africa"). The overall score allows for country and individual comparison and reflects different cultural intelligence levels. The percentage of all correct answers were measured, to determine the overall knowledge score which were used in the data analysis.

To measure the participants *English language skills* (M= 8.24, SD= 2.19, MED= 9), including listening, reading, speaking and writing skill, a five-point self-evaluation scale was used ranging from 6=very poor to 10= excellent (e.g., “How would you describe your ability to understand spoken English?” and “How would you describe your ability to understand texts written in English?”). The English language skills was also measured using a TOEFL-like short test where the objective score rated from 1 - 10. TOEFL test was first introduced in 1995, and is constructed to measure communicative language ability for speaking, listening and writing skills (Enright et al., 2000) making it a natural choice to measure language abilities. All together an average score based on the results from these questions were conducted and used as a variable in the data.

### *Cultural background*

To measure the participants cultural background, questions about *country of origin* and *international experience* (M= 0.11, SD= 0.31, MED=0) were addressed using direct question (e.g., “What country do you consider your home country at this time?” and “Have you ever been asked to live abroad for work?”). Further, using direct question, the participants were asked *if the country where they studied during the project was different from their country of origin* (M= 0.26, SD= 0.44, MED=0).

Continuing, the participants were asked how many *different countries they had lived for more than six months other than the country of origin* (M= 0.41, SD= 0.75, MED= 1) Direct questions were used, with a scale ranging 0;1;2;3;4;5;5+. Moreover, the *duration of last work abroad* (M= 6.94, SD= 11.27, MED= 3) was addressed with direct question and measured with a four-point scale roughly equal to the number of weeks (“How long did you work abroad on your last international assignment?”). To address to what degree the participants had *experience interacting with foreigners on a daily basis* (or were members of international study or work groups in home country) (M= 23.07, SD= 53.33, MED= 6), direct questions measured on a four-point scale in weeks were used. Lastly, *the total time of study abroad* (M= 6.94, SD= 11.27, MED= 3), *total time as tourist abroad* (M= 33.20, SD= 37.27, MED= 26) and *total work abroad* (M= 37.09, SD= 41.15, MED= 26) were measured in weeks.

## Personality

To measure the characteristic of *Openness*, *Extraversion*, *Conscientiousness*, *Agreeableness* and *Emotional Stability*, the “Big Five Personality Scale” based on John et al. (1991) and John et al. (2008) was used. The participants were asked to rate the level of agreement using a five-point scale ranging from 1= not me at all and 5= definitely. The level of the various characteristics were as follow: Level of *Openness* (M= 3.62, SD= 0.56, MED=3.60), (e.g., “Values artistic, aesthetic experiences” and “Has few artistic interests”), level of *Extraversion* (M= 3.41, SD= 0.41, MED= 3.38), (e.g., “Has an assertive personality” and “Is full of energy”), degree of *Conscientiousness* (M= 3.36, SD= 0.35, MED= 3.38), (e.g., “Can be somewhat careless” and “Tends to be disorganized”), level of *Agreeableness* (M= 4.23, SD= 0.46, MED= 3), (e.g. “Can be cold and aloof” and “Starts quarrels with others”) and lastly the degree of *Emotional stability* (M= 3.03, SD= 0.43, MED= 3), (e.g., “Remains calm in tense situations” and “Gets nervous easily”). The average of each dimension was calculated and used as a variable in the data.

Furthermore, *Grit* (M= 3.49, SD= 0.42, MED= 3.50) measures persistence and performance beyond those of IQ and conscientiousness (A. L. Duckworth, Peterson, Matthews, & Kelly, 2007). To measure the participants’ level of grit, a 5-point Likert scale was used, ranging from 1= strongly disagree to 5= strongly agree on the items (e.g., “If I have a goal, I won’t stop even it if takes me years to achieve it” and “Problems and setbacks don’t discourage me”). The average score was conducted and used as a variable in the data.

Trust might also influence the level of CQ (Chua, Morris, & Mor, 2012; Erez et al., 2013). Using a 5-point scale with measures ranging from, 1=never and 5=always, the participants’ *propensity to trust others* (M= 3.72, SD= 0.71, MED= 3.75) was measured. The respondents were asked to choose the level of agreement to various statements (e.g., “Most people can be counted on to do what they promise to do” and “Most people can be trusted”). The average scale was calculated and used in the sample analysis.

An instrument based on VandeWalle (1997) and the “Work Domain Goal Orientation Instrument” were used to measure *learning orientation* (M= 80.89, SD=19.77, MED= 86,67). This instrument seeks to identify three goal orientation dimensions; learning, avoid and prove and is especially developed for use in work-related settings (VandeWalle, 1997). The *learning orientation* variable was measured during week 6 of the X-Culture Project with a 5-point scale, 1= not me at all and 5= definitely me (e.g., “I am willing to select a challenging work

assignment that I can learn a lot from” and “I look for opportunities to develop new skills and knowledge”). A scale average was conducted and included in the measures.

To measure *narcissist traits* ( $M= 0.22$ ,  $SD= 0$ ,  $MED= 0.22$ ) the participants were asked to evaluate two statements and choose which of the two described them better (e.g., “I like to be the center of attention: I prefer to blend in with the crowd” and “I like having authority over people: I don't mind following orders”). The results from the multiple statements were added into one variable of measure.

*Task performance* (also known as “Bottom-line mentality”) ( $M= 1.74$ ,  $SD= 0.00$ ,  $MED= 1.74$ ), is a variable measuring the participants’ focus on getting things done. It was conducted using a 7-point scale from 1= disagree to 7= agree. The participants were asked to rate their level of agreement to a variety of statements (e.g., “I treat the bottom line as more important than anything else” and “I care more about task performance than team members well-being”) and an average score was measured to include as a variable.

#### *Data analysis tool – DataRobot*

*DataRobot* is a platform based on *artificial intelligence* (AI) with the purpose to “unlash the full potential of human and machine intelligence”. It uses automated tools to provide value from data in addition to utilize automation to prepare, build, deploy and maintain the models. In addition, user interfaces are assisted by AI and feature engineering, model selection and tuning are done automatic. With *DataRobot*’s advance classification, time series, regression and specialized learning models can be made, and data preparation is included in the program. Both numerical, free-form text, geospatial and image data can be uploaded to the database without any need for pre-processing data (*DataRobot*, 2021b). After choosing which values to include in the dataset, the finished version can be uploaded to the platform and the program automatically deploys models, maintain them to provide the most accurate results, and presented models, charts and statistical measures based on the provided data.

*Data Robot* is made to be useful for many different user types. Furthermore, it allows for example business analysis and analytics leaders to work without using data scientific in addition to reduce the workload of data scientists and engineers. The program can be useful across many industries, all from financial services, manufacturing and healthcare since *DataRobot* can make predictions, support critical decision and optimize outcomes. To make the platform user-friendly, a variety of platform documentation, *DataRobot* university and

community and enterprise support are available including the option to ask questions and watch learner videos (DataRobot, 2021b).

### *DataRobot – Relevant tool for this research*

With the aim to research a broad range exploration of correlations of CQ, DataRobot was a suitable tool to use. The tool uses supervised machine learning (Larsen & Becker, 2018), whereas the user chooses a target variable to base the model on. *Total CQ* was in this case chosen as the target variable to identify reliable predictors of potential CQ influencers. With the given data having complex pattern of missing features due to various questions used in each semester for the participants in the X-Culture Project, and of high dimension, (58 784 datapoints) traditional imputation methods for missing values, like “average imputation” (Stekhoven & Bühlmann, 2012) and “missing at random” (Rubin, 1976) were not beneficial to fill out empty rows in the data as this would provide bias results (Donders, Van Der Heijden, Stijnen, & Moons, 2006). With the use of DataRobot this was no problem because of its unique features and complex AI technology based on algorithms for accurate predictions (Larsen & Becker, 2018).

Another strength making DataRobot an useful tool for this research is the program’s ability to detect relationships between categorical and numerical information. This is done using a feature association matrix where the strengths of the association is indicated using colors, and the various colors represent the clusters of features that are associated with each other (DataRobot, 2021b) (see Figure 4-5). This was a great advantage since the questioners used in the data collection were based on different questioners with many questions being related to each other and measuring the same variables only phrased a little differently. This feature made it possible to choose appropriate variables and also the relationship between any two featured could be studied.

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Insert Figure 4 - 5 here  
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### *Machine Learning Model Accuracy*

Accuracy is important when determining what model to use for analysis. A good model is able to identify patterns and relationships between variables in a dataset based on the training

data or the input and can generalize “unseen” data in an accurate way. The better the model is at generalizing; the more accurate insight and predictions will be produced (Weiss & Freeman, 2007). DataRobot uses open-source algorithms to develop its models. It tests its accuracy using 5-fold cross-validation, which prevent the likelihood of target leakage and other factors that might affect the model negatively (DataRobot, 2021c). For the date used in this study, the “Root Mean Square Error” (RMSE) gave the best fit, with a cross-validation of 0.6449. The cross validation examines the training, holdout and validation process to minimize bias results of the sampling (DataRobot, 2021a).

The “R-square” is a common statistical measure for liner models. It uses predictive statistics to determine how close the data and the fitted regression line is, and the higher the R-squared, the better the model fit the data (Rieuf, 2017; Saltelli, 2002). In DataRobot, the given cross-validation of the R-squared matrix was 0,4659, indicating that the model is able to make predictions explaining 46,59% of the variance. In comparison, the RMSE had a cross-validation of 0.6449. By the use of square root of the variance of the residual, the RMSE measure the fit of the model by indication how close the observed data points and are to the predicted values of the model (the standard deviation of the residuals). While the R-square measures the relative fit, the RMSE indicates the absolute fit of the model and is often used to compare models and indicating which model best fit the data at hand. Lower values of RMSE represent better fit (Coursera, 2021). The RMSE number of 0,6449 therefore indicate some spread, but since the values in X-Culture Project are normality distributed, the RMSE provide a 95% forecast of the interval for new observations (Coursera, 2021), which is the reason RMSE was chosen as the preferred matrix for this study.

### *Modeling process*

The mode *Autopilot* in DataRobot was used to model the data. In this mode DataRobot suggests models that are best suited to predict the target. The program created an informative *feature list* and based on this list variables that did not show great fit to the target could be excluded. With these settings, 92 models were generated.

Models were compared with the use of *learning curves* (see Figure 6). DataRobot only continues the modeling process with models showing accurate results. It uses various *gradient boosted trees classifiers* and *blender models* to produce the most accurate models for further consideration (Larsen & Becker, 2018). The comparison feature *Speed vs. Accuracy* in



DataRobot showed that the blender models were predicted faster than gradient boosted trees classifiers.

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Insert Figure 6 here  
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Under the tab “*Leaderboard*” the suggested models were listed based on their level of accuracy metric. The model “*eXtreme Gradient Boosted Trees Regressor with Early Stopping and Unsupervised Learning Features*” was marked with “Recommend for deployment” which means that DataRobot based on accuracy and complexity recommended that model, and “Prepared for deployment” indicating that cross validation and holdout data has already been measured by DataRobot. Figure 7 shows the blueprint for the recommended model.

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Insert Figure 7 here  
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The *Gradient Boost Regressor (xgboost)* used in the recommended model is a cutting-edge algorithm specialized to make extremely accurate predictive models (DataRobot, 2021b). It learns features of several regression trees, identifies nonlinear interactions between features, combine feature selection and classification into one, and is very fast, as well as accurate in feature selection and trade off (Chen et al., 2015; Xu, Huang, Weinberger, & Zheng, 2014). The model “*eXtreme Gradient Boosted Trees Regressor with Early Stopping and Unsupervised Learning Features*” was recommended for deployment since it identified the best validation and cross-validation score and is able to retrain a high sample size (Xu et al., 2014). It was trained using 100% of the rows, with a cross validation of 64%.

Sorted from lowest to highest risk, data was divided into bins in a *lift chart*. By ordering predictions in increasing order and divide them into equal size groups, bins are created and the average target value in one bin can be seen on the vertical axis (DataRobot, 2021b). The lift carts for the model created can be seen in Figure 8. The lift cart indicates that the model can predict extremely well, but not all features related to CQ are recognized based on the actual line being above/ below the predicted line at some points of the chart.

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Insert Figure 8 here  
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A chart for *feature impact* described which features are the most important in the prediction model. The effect is proportional to the most significant element, which is marked as having a 100% effect. Feature impacts show the most relevant features related to the target variable and can be used to check if the important characteristics are within reason and if the model is trustworthy. In the model used for this research, *Learning orientation* is the most effective feature (see Figure 9). The next two features are *Home country* and *English language skills*. The effects do not drop significantly, but are constantly descendent, therefore a clear limit cannot be made for the most important characteristics. Based on the feature impact, variables were evaluated more closely and those of no to little relevance were left out.

The *graph of feature effect* shows how DataRobot uses variables to predict the probability of the different variables being related to CQ. The feature effect graph for *Learning orientation* (see Figure 10 and Table 3) shows that individual more interested in learning new things have a higher total CQ score. When the learning level is above 75, a significant increase in CQ can be seen. The results are reasonable as people interested in learning often show high curiosity and open-mindedness, which might have positive effect on CQ. Results from *Daily interaction with foreigners* show that CQ increases linearly the more experience the participants have interacting with culturally diverse others. This is also reasonable as more interaction with culturally diverse others, online or face to face, has shown to increase CQ. Variables related to the degree of intercultural experience were seen to be effective in the model. In general, feature effect provide good information about the effect different characteristics can have on CQ level.

Graphs of *Feature fit* show how the model works on each variable (DataRobot, 2021b). The feature fit shows to be very exact, see Figure 11 for example of feature effect for the variable *Learning orientation*. Predicted values can be seen to follow actual values in the different lows and highs in the model, also for large changes from feature value 50. It is positive for the model that *actual* and *predicted lines* cross each other multiple time, but one should be aware that exactness of the prediction should not follow actual values and be cautions of the predicted line being too smooth (DataRobot, 2021b).

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Insert Figure 9 - 11 here  
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Insert Table 3 here  
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## RESULTS

### Informative Features

In this part, results from the DataRobot analysis will be analyzed. There were 31 features in the dataset and 25 were selected to the *Informative Features List* (see Figure 9). The Informative Feature List presents an overview of the most influential measures in the given set of data ranged by order of importance to the target (Total CQ score).

### Categories

Figure 12 demonstrates the various variables that were chosen in the DataRobot modeling process divided into the five categories: Competencies, Personality, Experiences, Demographic and Cultural Background. The results will be analyzed with basis in the categories, and each trait within the various categories will be presented after order of importance to total CQ score.

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Insert Figure 12 here  
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### Statistical results

The statistical results (*mean, standard derivation and median*) after running the model “*eXtreme Gradient Boosted Trees Regressor with Early Stopping and Unsupervised Learning Features*” in DataRobot are presented in Table 2. These results provide information on the correlation between total CQ and the features relevant for the CQ score of the individual. Since the feature *CQ Knowledge* consists of several dimensions to measure the level of knowledge, a separate correlation table for this feature was conducted. Results can be seen in Table 4.

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Insert Table 4 here  
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### Curves

DataRobot has created three curves; *Partial Dependence* (Average Partial Dependence), *Predicted* (Average predicted CQ total) and *Actual* (Average actual CQ total) for each variable in relation to total CQ score. The Partial Dependence plot demonstrate the marginal effect the selected feature has on the target. It indicates if the relationship between the feature and target (total CQ score) is linear, monotonic or complex (Greenwell, 2017). The Predicted curve illustrate the forecasted value of the target in relation to CQ, while the Actual curve is a validation model to validate the forecasted values. The further analysis of the result of each variable will focus mainly on the Partial Dependence curve.

### Results for each feature ranged by category

#### *Competencies*

*Level of knowledge* (M= 25.79, SD= 22.04, MED= 15.55) is a complex feature that was measured using a variety of different instruments for knowledge. Therefore, as a robustness test, a new separate model was made in DataRobot where variables that measure different aspects of knowledge level were included. Figure 13 shows the feature effect for each variable included and its importance to *CQ Knowledge* ranked from most important to least important. The results show that the most important feature to describe CQ score related to knowledge is *Agreeableness*, with 100% impact on the target variable. Second is *English language skills* (26% impact), followed by *Home country* (23% impact) and *Gender* (21% impact). Next in range comes, *Tourism (total time)* (17% impact), *Age* (15% impact), *Study abroad (total time)* (14% impact), *Daily interaction with foreigners* (12% impact), *Level of education* (9% impact), and least important seems to be the features *Work abroad (total time)* (5% impact) and *International student* (3% impact).

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Insert Figure 13 here  
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*English language skills* ( $M=8.24$ ,  $SD= 2.19$ ,  $MED= 9.00$ ) is observed to have an 85% effect on the total CQ value. It is ranged as the third most relevant skill for overall CQ in the Feature impact list (see Figure 9). Figure 14 shows the various score of total CQ in light of the participants results on the TOEFL language test and ranging of own abilities in writing, listening, and speaking. The Partial Dependence graph shows a positive relationship between total CQ for feature values between 3.5 - 5. Then a decrease in the relationship can be observed, before it continues in a positive manner from feature 5-10. Highest CQ is observed for participants with test score of 9/10 and lowest score is observed for participants with results between 6/10. These results indicate that people with poor language skills can still have better level of CQ abilities than those with medium English proficiency level, but that having good competencies in English is the most beneficial.

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Insert Figure 14 here  
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*English exam score* ( $M= 9.09$ ,  $SD= 1.15$ ,  $MED=9.00$ ) is observed to have a 62% effect on CQ level. It is ranged as number 4/25 on the Feature impact list (see Figure 9). Figure 15 shows participants' level of CQ in relation to exam results (ranged on a scale from 1-10). The Partial Dependence graph indicates a positive relationship between the target and feature value from test score between 0-1. From score between 1-2 a sharp decline in value is observed before it continues in a linear flat way for the rest of the feature values. Participants with exam score of 4 is observed to have the highest level of CQ and lowest observed CQ value is seen for participants with exam score ranked at 2. These results indicate that participants with less than 50% correct on the exam have the best CQ, suggesting that one does not necessarily need high grammar and deep structural understanding of a language to be an efficient communicator in an intercultural setting.

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Insert Figure 15 here  
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### *Personality*

*Learning Orientation* ( $M= 80.89$ ,  $SD= 19.77$ ,  $MED= 86.67$ ) is observed to be the most important feature to describe the overall level of CQ with an impact of 100% on the target and

ranked as number 1/25 on the Feature impact list (see Figure 9). The results can be seen in Figure 16. High feature values indicate high willingness to take on challenging tasks and high motivation and willingness to learn new things. The Partial Dependence graph develops in a linear positive direction for all values. Participants with a score of 52/100 is observed to have the highest total CQ and the lowest CQ score is observed among participants with a learning orientation of 60/100. This explains that people with a moderate level of risk-taking and ambition have the highest CQ, and the effect of this trait is positively related to CQ level.

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Insert Figure 16 here  
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*Consciousness* (M= 3.36, SD= 0.35, MED= 3.38) is observed to have a 34% effect on the total CQ score. The results indicate that this feature is the second most important of the Big 5 personality traits to predict CQ and it is ranged as number 6/25 on the Feature impact list (see Figure 9). Figure 17 demonstrates the relationship between the level of consciousness and total CQ score. The higher the feature value, the stronger degree of consciousness is observed. The Partial Dependence graph shows a flat positive curve indicating a positive relationship between the feature value and the target, with a slow positive growth. The highest level of CQ is observed for participants with the highest consciousness score, ranged at 4, while the lowest level of CQ is observed for participants with the lowest score, measured at 3. This means that the stronger level of consciousness the individual possesses, the stronger CQ score can be expected.

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Insert Figure 17 here  
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*Openness* (M= 3.62, SD= 0.56, MED= 3.60) is observed to have a 28% effect on the total CQ score. The results indicate that this trait is the second most important feature in the category of personality, and the most important Big 5 personality trait to influence total CQ level. It is ranked as number 9/25 on the Feature impact list (see Figure 9). Figure 18 demonstrates the relationship between openness in relation to total CQ value. Low feature value indicates low degree of openness and high numbers represent high degree of this personality feature. The Partial Dependence graph demonstrates a positive relationship

between the target value and the feature openness as the graph develops in a linear positive way. The higher the score of openness, the higher level of CQ can be observed. Highest level of CQ is measured for participants with a score of openness at 5, and the lowest can be observed for participants with a score of 3. This indicate that high degree of openness is positive for CQ level.

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Insert Figure 18 here  
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*Agreeableness* (M= 4.23, SD= 5.46, MED= 3.00) has a 28% effect on the total CQ score. It is seen to be the third most important of the Big 5 personality traits on CQ and it is ranged as number 10/25 on the Feature impact list (see Figure 9). Figure 19 demonstrates the relationship between the level of agreeableness in relation to CQ. High feature values indicate strong degree of agreeableness and low values means that lower degree of this feature is observed. The Partial Dependence graph shows a negative curve for feature values between 1-7 and continues in a flat manner for the continuing values. These results indicate a negative relationship and insignificant relationship between agreeableness and total CQ score. The highest level of CQ is observed for participants with an agreeableness level of 5, and the lowest level was measured for participants ranged with an agreeableness score of 6. These results indicate that a person that show high degree of agreeableness does not necessarily have high CQ.

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Insert Figure 19 here  
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*Emotional stability* (M= 3.03, SD= 0.43, MED= 3.00) has a 24% feature effect on the total CQ score. It is ranged as the second least important Big 5 personality trait to predict CQ and it is ranged as number 12/25 on the Feature impact list (see Figure 9). Figure 20 presents the relationship between the level of emotional stability and total CQ value. The higher the feature value, the stronger degree of emotional stability is observed. The Partial Dependence graph shows a curvilinear pattern for the various levels of emotional stability, with a slightly negative decline. These results demonstrate an insignificant and somehow negative relationship between emotional stability and the level of CQ. The highest level of CQ is observed for participants with a feature value score between 3,562 - 3.65, and the lowest score

of CQ in relation to emotional stability was observed for participants with a score between 3.388 - 3.475, indicating little difference in CQ score for the various levels of emotional stability. These results suggest that the level of emotional stability does not have any significant impact on the level of CQ.

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Insert Figure 20 here  
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*Grit* (persistence) ( $M= 3.49$ ,  $SD= 0.42$ ,  $MED= 3.50$ ) is observed to have a 17% effect on total CQ. It is ranked as number 15/25 on the Future impact list (see Figure 9). Figure 21 presents the observed relationship between participants' level of persistence in relation to CQ. The higher the feature value, the more goal oriented the person is observed to be. The Partial Dependence graph shows a positive increase in CQ values the stronger degree of Grit, demonstrating a positive relationship between the feature value and target. The highest value of CQ is observed for participants with the highest measured grit score of 4, and the lowest level of CQ is observed for participants with the lowest total grit score measured at 3. These results indicate that grit is positively related to CQ and the higher the level of persistence, the higher the CQ level can be expected.

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Insert Figure 21 here  
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*Extraversion* ( $M= 3.41$ ,  $SD= 0.41$ ,  $MED=3.38$ ) is measured to have a 11% effect on total CQ. This makes it the least important feature of the Big 5 personality traits to explain CQ and it is ranked as number 20/25 on the Feature impact list (see Figure 9). Figure 22 demonstrates the measured relationship between the level of extraversion in relation to CQ. The higher the feature score, the higher level of extraversion is observed. The Partial Dependence graph shows a positive increase for feature values between 2-4, indicating a positive relationship between extraversion and CQ level. From feature value 4-5 the curve drops, suggesting a negative correlation between CQ and extraversion in this interval. The highest degree of CQ is observed for participants with extraversion level of 4 and the lowest CQ level can be seen for feature value score at 3. These results indicate that possessing high degree of extraversion is positive for CQ, but too high values can also have a negative effect on how you come across in an intercultural setting.



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Insert Figure 22 here  
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*Trust* (Propensity to trust strangers) ( $M=3.72$ ,  $SD= 0.71$ ,  $MED= 3.75$ ) is measured to have a 10% effect on total CQ. It is ranged as number 21/25 on the Future impact list (see Figure 9). Figure 23 demonstrates the observed relationship between the level of trust in relation to CQ score. The higher score of the feature value, the higher level of trust in others are observed. The Partial Dependence graph develops in a positive manner for feature values from 1-5, indicating a positive relationship between trust level and CQ score. From feature value 5-6 a drop can be observed, suggesting a small decline in CQ from previous observed values for participant with high level of trust. The highest level of CQ is observed for participants with trust level measured at 4 and the lowest CQ score is given at a trust level of 2. These results demonstrate that overall, the higher the trust a person has in others, the higher the CQ level can be expected.

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Insert Figure 23 here  
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*Task performance* ( $M= 1.74$ ,  $SD= 0.00$ ,  $MED=1.74$ ) seems to have a 0% effect on the total CQ. It is ranged as number 24/25 on the Future impact list (see figure 9). No values are given in the Partial Dependence graph (see Figure 24), demonstrating that this trait has a very low relevance for the overall CQ score compared to the other observed features included in this study.

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Insert Figure 24 here  
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*Narcissism* ( $M= 0.22$ ,  $SD= 0.00$ ,  $MED= 0.22$ ) is measured to have a 0% effect on the total CQ. It is ranged as number 25/25 on the Future impact list (see Figure 9), making it the least important features to impact CQ level from the variables included in this study. No values can be observed in the Partial Dependence graph (see Figure 25), indicating that this feature has very little/no effect on participants' overall CQ seen in relation to the other measures included in the analysis.

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Insert Figure 25 here  
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### *Experiences*

*Work experience* ( $M=3.52$ ,  $SD=1.74$ ,  $MED= 4.00$ ) is measured to have a 15% effect on the overall CQ score, making it the most important feature related to experiences. It is ranked as number 17/25 on the Feature impact list (see Figure 9). Figure 26 demonstrates the relationship between work experience and the level of CQ score. The higher the feature value, the more work experience the participant has. The Partial Dependence graph show a flat positive curve from feature value 1-3 (not working to 1 year of work experience). Between feature value 4-7 (2-10 years of work experience) the curve drops. This suggests a positive relationship between CQ and work experience up until a certain point. The highest level of CQ is observed for feature value 4 (2-3 years of work experience) and lowest CQ is measured for feature value 7 (more than 10 years of work experience). These findings suggest that CQ score increases the most during the first years of employment, then it stays constant for some time, and after some years of working, CQ level can be expected to decline.

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Insert Figure 26 here  
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*Job now* ( $M= 1.97$ ,  $SD= 1.29$ ,  $MED= 1.00$ ) is measured to have a 13% effect on the target and it is listed as number 18/25 on the Feature effect list (see Figure 9). Figure 27 shows the relationship between the employment situation and CQ. The higher feature value score, the more hours and complex job the student is working in addition to studying. The Partial Dependence Graph develops in an overall positive manner, demonstrating a positive relationship between employment and CQ score. The highest level of CQ is observed for feature value 5 (I currently run a business full-time with at least 5 full-time employees) and the lowest level of CQ is measured at point 2 (I am a student and work on campus up to 20 hours a week). These results indicate that having a part-time job in addition to studying can have a positive effect on CQ score, and high responsibility in the job seems to be a positive.

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Insert Figure 27 here  
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*Manager experience* (M=1.59, SD= 0.94, MED= 1) is measured to have 11% effect on the target and is listed as number/25 on the Feature effect list (see Figure 9). Figure 28 shows the relationship between managerial experience and CQ level. The more years of managerial experience the participant has, the higher is the target value. The Partial Dependence graph shows a linear positive relationship from feature value 1-3 (No manager experience - Supervisor of a department with 5-10 people). Then from 3-4 (Supervisor of a department with 5-10 people - Supervisor of a larger division with 10-20 people) a decline in value can be observed. Highest CQ is measured at target value 3 and lowest CQ is observed for target value 1. These results indicate that having manager experience can be positive for the level of CQ, but that the size of the division does not necessarily mean higher CQ.

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Insert Figure 28 here  
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*Work now* (M= 1.88, SD= 1.06, MED=2) is ranked to have a 7% impact on the overall CQ score and is listed as number 19/25 on the list of Feature effects (Figure 9). Figure 29 demonstrates the relationship between work situation (in addition to being a student) and level of CQ. The higher the feature values the more the person work and the more complex is the job. The graph shows inconsistent values but based on the scatter points it seem to be a negative relationship between feature value 0-1 (Not working - 20 hours work outside study). For the continuing values, the scatter points seem to be inconsistent. Still much indicate that the values develop in a flat manner, indicating that employment situation at the given point does not have a significant influence on CQ. Highest CQ value is observed for feature value ranged at 4 (Yes, I study and I run my own business) and lowest CQ is observed for feature value 5 (Other). These results indicate that working in addition to studying (and the level of responsibility in the work) have moderate to low influence on CQ. (This result differs from the very similar variable *Job now*, suggesting some inconsistency to what degree employment situation do effect CQ score).

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Insert Figure 29 here  
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*Asked to live abroad* ( $M= 0.11$ ,  $SD= 0.31$ ,  $MED= 0.00$ ) shows a 1% impact on the overall CQ score and is listed as number 20/21 on the list of Feature effect (see Figure 9). Figure 30 demonstrates the CQ level measured for participants asked to live abroad and participants who had not been asked to live abroad. The results demonstrate higher CQ values for participants who had not been asked to live abroad, compared to those who had been asked, suggesting that having had the offer to live abroad is not a good indicator to determine level of CQ.

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Insert Figure 30 here  
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*Number of countries* ( $M= 1.4$ ,  $SD= 0.75$ ,  $MED= 1$ ) the participant has lived in shows a 1% impact on the overall CQ score and is listed as number 21/25 on the list of Feature effect (see Figure 9). Figure 31 demonstrates the relationship between the number of countries a person has lived in (ranged from 1-5) in relation to CQ score. The Partial Dependence curve shows a positive linear relationship between CQ and number of countries from feature value 1- 2, (1- 2 countries). From 2-4 (2-4 countries), the curve drops, indicating a negative correlation between CQ and feature value. Highest CQ is observed for participants having lived in 2 countries, and lowest CQ is measured for participants who had lived in 4 countries. In addition, people who had lived in only 1 country demonstrate better CQ level than those who had lived in 3. This indicates that the more countries a person has live in does not necessarily mean they have the highest level of CQ, but also it is beneficial to have lived in more than one country.

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Insert Figure 31 here  
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*Satisfaction with last experience abroad* ( $M= 3.47$ ,  $SD= 0.67$ ,  $MED= 4.00$ ) is measured to have a 1% impact on the overall CQ score and is ranked as number 23/25 on the list of Feature effect (see Figure 9). Based on these results it is the least important trait related to experiences to describe CQ. Figure 32 demonstrates the relation between the measured level of satisfaction with last stay abroad in relation to CQ score. The higher the feature value, the more satisfied the participants were with the experience. The Partial dependence graph demonstrates a negative decline from feature value 1-2 (very unsatisfied - unsatisfied),

indication a negative correlation to CQ. From feature value 3-4 (satisfied - very satisfied) the graph proceeds in a positive manner suggesting a positive relationship between level of satisfaction and CQ score. In other words, the more satisfied the person was with the last stay abroad, the higher score of CQ could in general be observed, indicating positive relation to CQ.

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Insert Figure 32 here  
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### *Demography*

*Age* (M= 22.92, SD= 4.58, MED= 22.00) was observed to have a 22% impact on the target value and is ranged as number 14/25 on the list of Feature effects. This high ranking makes it the most important feature to explain CQ in regard to demography. Figure 33 shows the relationship between age and CQ level. The Partial dependence curve demonstrates a curvilinear relationship between the two traits reflecting some variation in the measured CQ level for each age group. Some general assumptions can be drawn from the results. Based on the positive curve from age 18-19 a positive correlation between CQ and age can be observed. From age 19-22, the curve drops, indicating a negative correlation between the CQ and feature value. From age 22-33, the curve is positive and from age 33-38, no significant growth or decline can be observed, indicating insignificant relationship between age and CQ value. The lowest CQ score is observed for participants at the age from 21-22, and the highest CQ score was observed for participants at the age of 28-29. Based on the broad variation of CQ values for each age, it is hard to conclude to what degree CQ values and age correlate, but in general people in their early thirties might have the best CQ level on average.

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Insert Figure 33 here  
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*Gender* (male=48% and female= 52%) is measured to have a 17% impact on the overall CQ level and is listed as number 12/25 on the list of Feature effect (see Figure 9). Figure 34 shows the correlation between gender and CQ level. The Partial Dependence graph shows CQ level for female measured at 4.26, while CQ level for male were predicted at 4.207, providing a difference between the two of 0.053. These closely related values indicate little variance in CQ score based on gender, suggesting that this trait is insignificant to CQ score.

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Insert Figure 34 here  
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*Education level* ( $M= 1.27$ ,  $SD= 0.54$ ,  $MED= 1.00$ ) is observed to have an 8% impact on the overall CQ level and it is listed as number 18/25 in the list of Feature effects (see Figure 9). Figure 35 demonstrates the relationship between education level and overall CQ level. The Partial Dependence curve is negative for feature values between 1-3 (Undergrad, MBA/Masters and EMBA), indicate a negative relationship to CQ. From feature value 3-7 (EMBA, Mix, Professional and Other) the curve is positive, indicating positive effect on CQ score. The highest value of CQ is observed for feature value 7 (Other) and the lowest CQ score is seen at point 3 (EMBA). In general, these results indicate that higher education does not necessarily mean higher CQ score.

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Insert Figure 35 here  
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### *Cultural background*

*Home country* is observed to be the second most important feature to impact overall CQ with an effect of 95% on the target (see Figure 9), in addition to being the most important feature in the category “cultural background”. Figure 36 shows an overview of the total CQ score in relation to home country. In addition, a list ranging the highest to lowest CQ scores observed based on country is provided. Top 3 countries with highest CQ score seems to be Brazil, Italia and Colombia, and lowest CQ score can be observed for participants from Thailand, France and Peru. These results indicate that the country of origin does have a significant influence on CQ score.

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Insert Figure 36 here  
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*International student* ( $M= 0.26$ ,  $SD= 0.44$ ,  $MED=0.00$ ) is observed to have a 48% effect on total CQ score and is listed as number 5/25 on the list of Feature effects (see Figure 9). This makes it the second most important feature in the “cultural background” category. Figure 37 shows an overview of CQ in relation to being an international student. The Partial dependence

graph shows that participants that lived in their home country when the data were collected had an overall CQ score of 4.307, while participants who lived abroad had a total CQ score of 4.298. This proved a difference in value of 0.006, indicating that participants that lived in their home country on average had highest CQ, but with such small variation in values between international and domestic students the difference is almost insignificant, indicating that being an international student does not predict higher CQ level.

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Insert Figure 37 here  
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*Daily interaction with foreigners* ( $M= 23.07$ ,  $SD= 53.33$ ,  $MED= 6.00$ ) is observed to have a 33% effect on total CQ score and it is ranked as number 7/25 on the Feature effect list (see Figure 9). Figure 38 demonstrates the relationship between interaction with culturally diverse others on a daily basis and total CQ score. The Partial Dependence graph shows a significant negative decline from feature value 1-11 (measured in weeks) indicating a negative relationship to CQ in this interval. From 11-21 weeks a small decline in value can be observed before it continues in a positive manner for all future values of CQ. The highest level of CQ is observed for feature value between 190-200 weeks and the lowest CQ measured is seen between 1-11 weeks. These results indicate that people with little interaction with culturally diverse on a daily basis can be expected to have lower CQ than those who on a regular basis interact with people from different cultural backgrounds.

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Insert Figure 38 here  
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*Tourism* ( $M= 33.20$ ,  $SD= 37.27$ ,  $MED= 26.00$ ) has a 31% feature effect on total CQ score and the trait is ranked as number 7/ 25 on the Feature effect list (see Figure 9). Figure 39 demonstrates the relationship between total time as a tourist (measured in weeks) in relation to CQ. The Partial dependence curve shows a curvilinear relationship for feature values between 0-50 weeks indicating a high variety in CQ score in this interval. From feature value 0-10 weeks the curve is flat, indicating no significant relationship to CQ. From 10-30 the curve has a round positive shape showing pattern of both negative and positive correlation to CQ. From feature value 30-50 the curve demonstrates a significant positive increase, before it at level 50-200 continues in a flat pattern indicating no significant relationship to CQ after a given time

spent as a tourist. The highest level of CQ is observed between week 40-50 and the lowest level of CQ is seen for feature value between 10-20. Overall, these results demonstrate that CQ level seems to be unaffected until week 20 of travel time. For the following weeks CQ might both increase and decrease, and after 40 weeks with travel time CQ level seems to increase significantly. After 50 weeks of being a tourist, CQ level stays constant. In general, the results indicate that longer than 40 weeks as a tourist is needed for CQ to be significantly positive effected and traveling as a tourist is overall positive for CQ development.

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Insert Figure 39 here  
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*Work abroad* (M= 37.09, SD= 41.15, MED= 26.00) is measured to have a 24% effect on the target and it is ranges as number 11/25 on the Feature effect list (see Figure 9). Figure 40 demonstrates the relationship between the total time of work abroad (measured in weeks) in relation to CQ level. The Partial dependence graph demonstrates a flat curve from feature value 0-20 indicating no significant relationship between feature value and CQ for this interval. This indicate that working abroad for a period up until 20 weeks most likely does not influence the level of CQ. From feature value 10-20 the curve is positive, suggesting that working abroad for the duration between 10-20 weeks might lead to increase in CQ level. From feature value 20-30 the curve drops before it again increases significantly from feature value 30-40. The graph continues in a flat manner from feature value 40-200. The highest value of CQ is observed after working abroad between 120-130 weeks, and the lowest CQ value is seen between week 20-30 of work abroad. Overall, CQ seems to increase and stay constant at a high level the more work abroad experiences the participant has.

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Insert Figure 40 here  
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*Study abroad* (M=35.19, SD= 40.55, MED= 26.00) is predicted to have a 18% influence on the target. It is measured to be the number 14/25 on the Feature impact list (see Figure 9). Figure 41 demonstrates the relationship between total time abroad (measured in weeks) seen in relation to CQ score. The higher the feature value, the more weeks the participant has spent studying abroad. The Partial dependence graph shows a curvilinear relationship for feature values between 0-40 indicating some spread in CQ values for this given interval. A positive



curve is observed between week 10-20, indicating a positive relation to CQ, suggesting that the participants' CQ level increase with study abroad experience that last more than 3 months. The graph shows a decline in value between week 20-30 indicating a negative relationship to CQ. Highest CQ level is measured between week 40-50 and lowest CQ values is observed between 20-30 weeks. From week 30-50 the graph shows a significant positive development, indicating high CQ development during this time abroad. From week 50, the graph shows a flat line, developing in a negative manner, indicating that CQ stays constant at a high level for further time abroad, or declines a little the longer participant study abroad. Overall, the results indicate that studying abroad for a duration of more than 30 weeks is positive for CQ development.

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Insert Figure 41 here  
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*Duration of last work abroad* (M= 6.94, SD= 11.27, MED= 3.00) is predicted to have 1% effect on total CQ score and it is listed as number 22/25 on the list of feature effect. This makes it the least important measure to CQ in the category of “cultural background”. Figure 42 demonstrates the relationship between the duration of last work abroad in relation to CQ level. The Partial Dependence graph shows a small negative decline from feature value 3-11 (More than 2 weeks and less than 6 months-One year) indicating a negative correlation to CQ during this time. From feature value 11-26 (One Year - One to three years) the curve is positive, indicating a correlation between CQ and target value. From value 26-80 (One to three years - Eleven to twelve years) the line is flat demonstrating no significant correlation to the target. Highest CQ level is observed for feature value 26 (One to three years) and lowest CQ is seen at point 7 (more than six months but less than 1 year). Based on this, it seems like expatriates with duration of one year and longer can have a positive effect on CQ level, and in the beginning of an international assignment several events might explain why CQ score declines.

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Insert Figure 42 here  
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## DISCUSSION

The goal of this research was to discover predictors of CQ and rank the relative importance of the factors related to CQ. With basis in the CQ model by Ang et al. (2007) to target CQ facets, and by the use of artificial intelligence for model prediction (DataRobot, 2021b), this study provides an unique insight into which traits are the most relevant for CQ. A variety of characteristics can explain CQ, and this study considered 25 features that in previous research have shown to be significant to CQ (see Appendix 2 for an overview of previous research on CQ in relation to the features included in this study). With inspiration from the structural categorization of traits introduced by Bird (2013), an overview of the features included in this study and their relative importance to CQ can be seen in Figure 43. This research shows that based on category, features related to *competencies* have overall the strongest influence on CQ. Second comes traits related to *cultural background*, followed by characteristics of *personality* and *demography* features. Least important traits to predict CQ is measured to be predictors related to *experiences*. Moreover, when studying each trait individually, results demonstrate that that the most significant trait to predict CQ score is *Learning Orientation* (100%), followed by *Home country* (95%) and *Language Skills* (85%). Figure 44 ranges the individual features after importance to overall CQ. For the more complicated trait labelled as *Knowledge Level*, the separate model conducted shows *Agreeableness*, *English language skills* and *Home country* to be the most relevant factors to explain this trait and its connection to CQ.

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Insert Figure 43 - 44 here  
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## PRACTICAL IMPLICATIONS

Intercultural competencies can be defined as “a set of cognitive, affective and behavioral skills and characteristics that support effective and appropriate interactions in a variety of cultural contexts” (Bennett, 2008, p. 95). With increased globalization, businesses are becoming more international and collaboration across boards and cultures are on arisen, thus settings where interacting and communication with culturally diverse others are many. When considering managerial related settings, it can be all from internal activities involving

colleagues, supervisors, team members and direct reports, to external stakeholders, like suppliers and clients etc., and in a global context the range of cultures can be many and very diverse (Bird et al., 2020). Considering that high CQ has shown to increase the ability to complete international expatriate assignments, increase effectiveness of international negotiations, increase productivity of international teams as well as the quality of the work conducted in cross-cultural settings, the understanding of CQ and insight into what traits could lead to efficient communication and adjustment are more relevant than ever.

This study ranging the relative importance of the factors related to CQ can therefore be very useful as it contributes to the understanding of CQ and what elements should be granted more focus, for example during selection purposes (assessments or job hiring, or for choosing candidates to training programs). The results of this research suggest that moving forward, more focus should be granted on determining an individual's *learning orientation* as this seems to be the most important predictor of CQ level. Furthermore, *nationality* influence CQ to a large degree, as well as *language abilities*.

In recruitment and hiring processes today, people are usually hired base on their experiences. Results of this study demonstrate that traits related to *experiences* overall are the least important traits to determine a person's CQ score. Instead, characteristics explaining a person's *competencies* are much more beneficial to predict high CQ, suggesting that more focus on learning about the individual's competencies should be given moving forward.

For example, to determine the candidates' level of CQ related to business context purposes, a BCIQ test (Alon et al., 2016) could be a good assessment tool in the search for the right candidates (those with high degree of the favored CQ traits) for the right jobs/assignments. This might also be especially important when recruiting leaders to various positions as the CQ score of a team leader can have significant effect on the team's social integration and performance (Presbitero, 2019; Richter et al., 2021).

Information about the traits and their degree of importance to CQ is also relevant for development and training purposes, both by the organizations and for individual development. Considering that competencies explaining types of *behavior* can more easily be learned, while others, like *personality traits*, are more defined by nature and harder to change (Mendenhall, Osland, & Stevens, 2015), one should select candidates that possesses high score of the competencies that are hard to influence and offer training for development for those competencies that can be learned. Based on the results of this research, it is stated that the most important personality features are *Learning orientation*, *Conciseness* and *Openness*. Paying extra attention to the individuals' score of these traits is therefore beneficial and important as

the level of these cannot easily be moderated by training. Furthermore, features like *level of knowledge* and *language skills* can be enhanced by CQ training, effort and experiences. Based on the feature's high ranking, it is suggested that high level of these traits should be favored in a recruitment processes, as well as offer regularly training to encourage and advance the depth and development of these traits.

## **LIMITATIONS AND FURTHER RESEARCH**

While this study is the first of this kind, and of high practical value, it is not without limitations. First, the sample was mostly comprised of students. It is possible that some of these relationships will not hold in a sample of older employees. Likewise, it is possible that there are more predictors of CQ that are undetectable in younger samples. Perhaps a certain work experience predicts CQ, but our study participants did not have this kind of experience, therefore this relationship could not be detected. Therefore, future researchers are encouraged to continue the search in samples with other demographic characteristics. Second, there are many models of CQ. This research relied on the model by (Soon Ang et al., 2007). Ang et al's model is the most popular, so the choice is justified, but it is possible that the results would have been slightly different if another model/instrument was used. Future researchers are therefore encouraged to re-examine the findings using other CQ models. Third, while several strong predictors of CQ were discovered, a theoretical explanation as to why was not provided as this was not the goal of this study. Most of the predictors that were identified make intuitive sense, and some have been described in prior literature. However, without a solid theoretical explanation, these predictors present only empirical evidence, but the actual nature of the relationship remains unknown. Research into the mechanisms and nature of these relationships would be a promising venue for future work of this kind.

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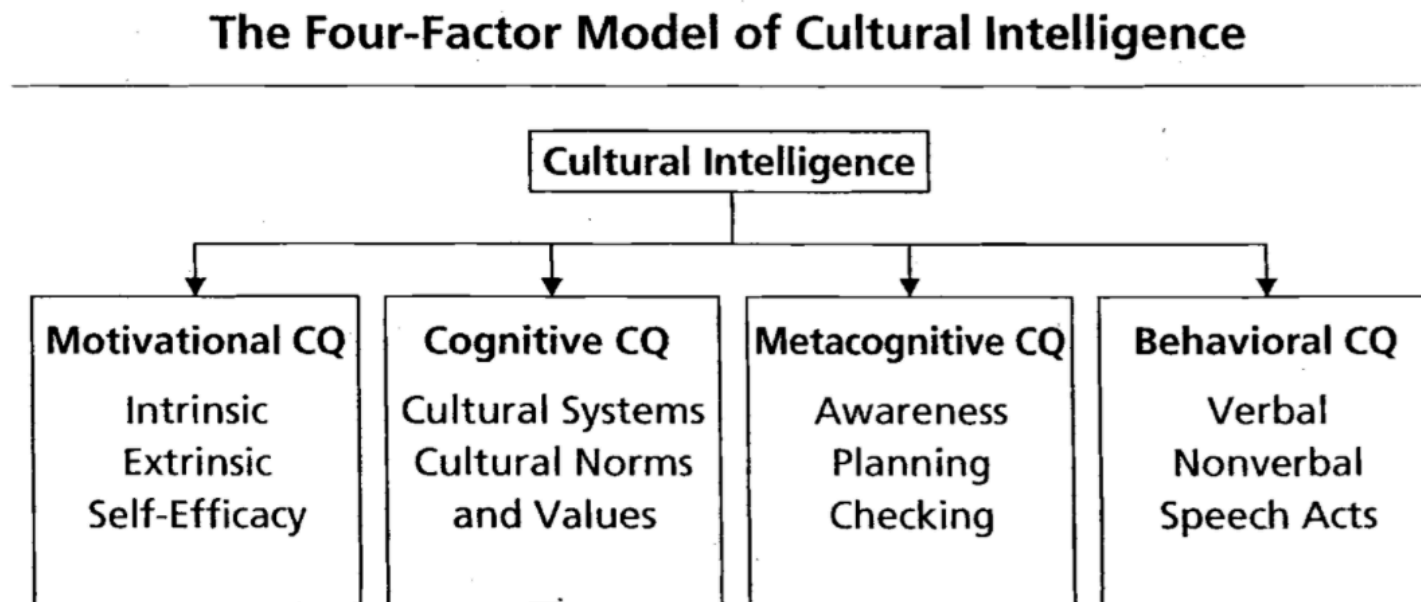
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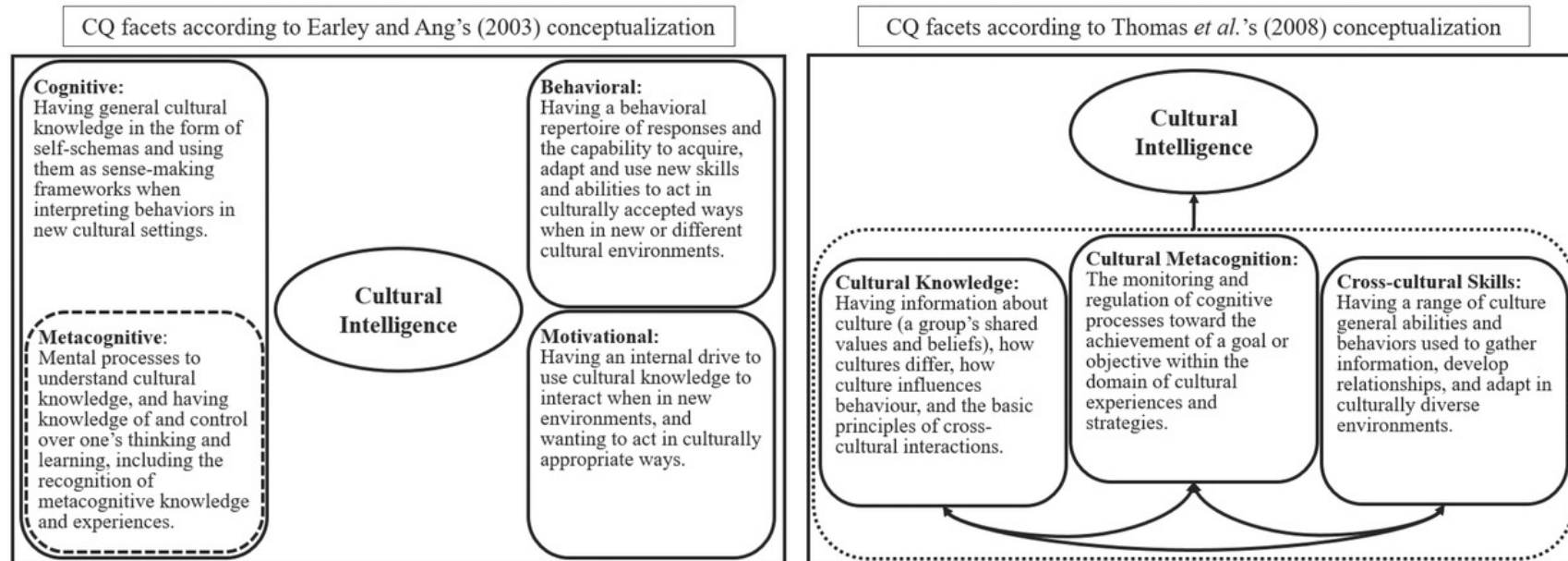
## *List of Figures*

**Figure 1:** The *Four-Factor Model* of Cultural Intelligence



(Van Dyne et al., 2008)

**Figure 2:** Summary of CQ facets based on conceptualization by Earley and Ang (2003) and D. C. Thomas et al. (2008).



See: Soon Ang et al. (2007) separated the metacognitive and cognitive factors and introduced the four factor construct of CQ.

Figure from: (Ott & Michailova, 2018)

**Figure 3:** Possible factors influencing CQ score

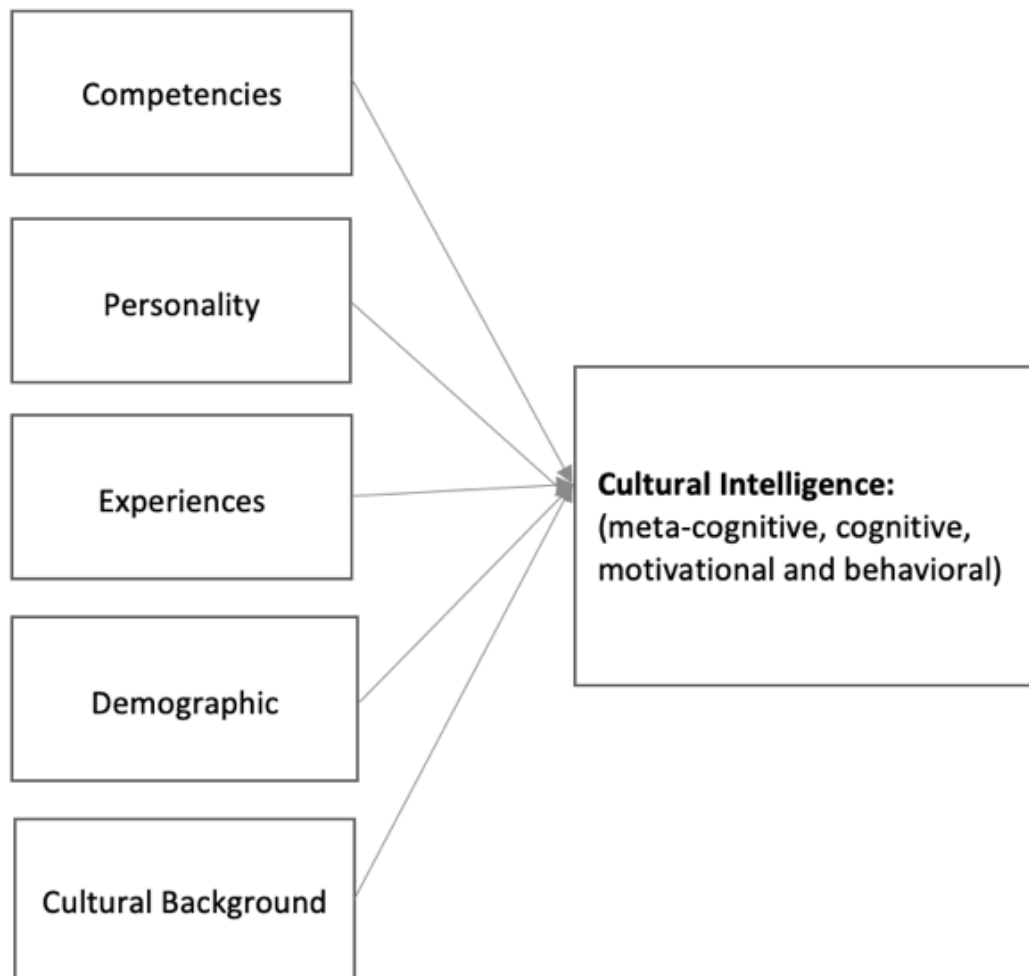
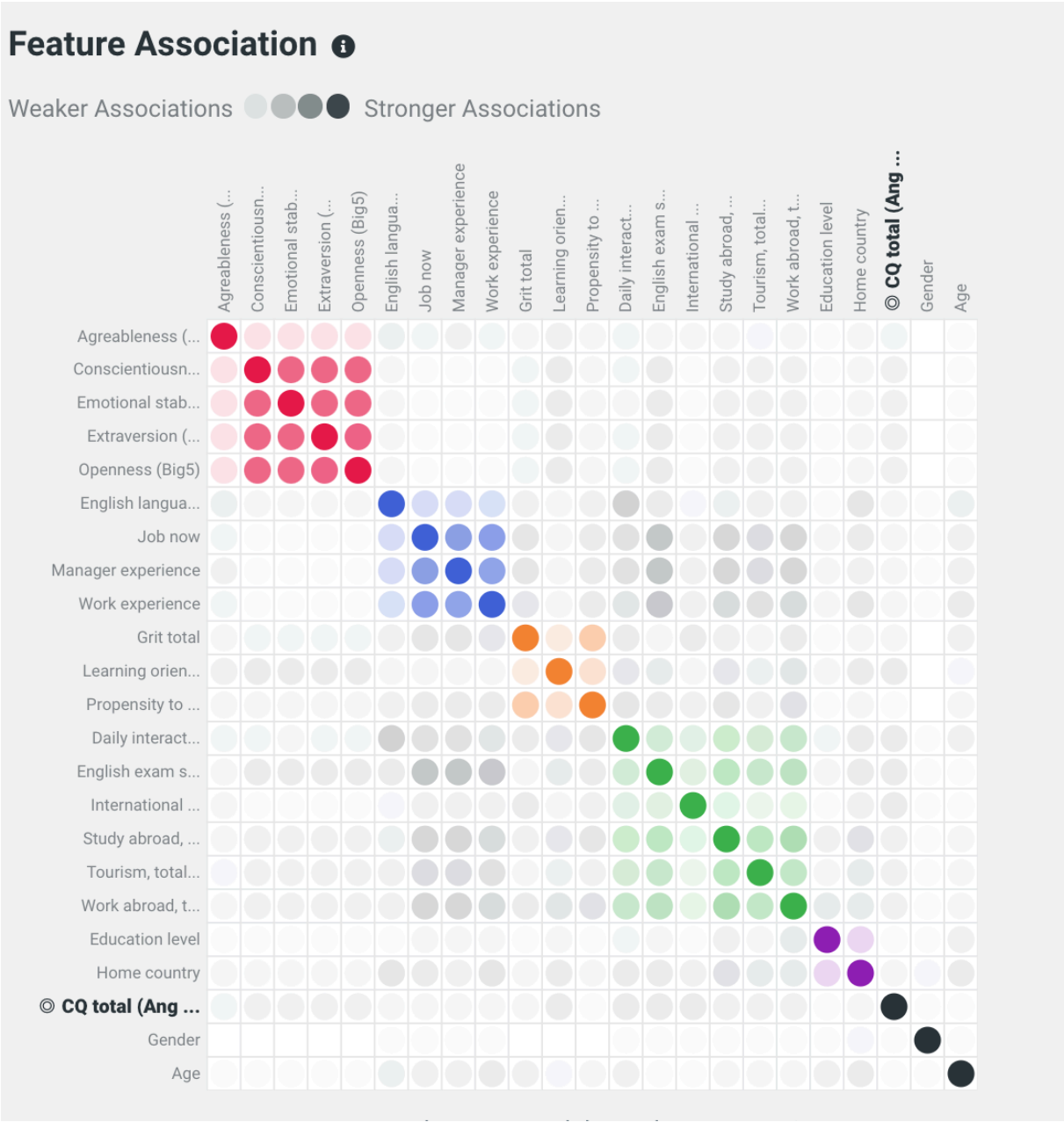


Figure 4: Feature Association



(DataRobot, 2021b)

**Figure 5:** Top 10 Strongest Associations

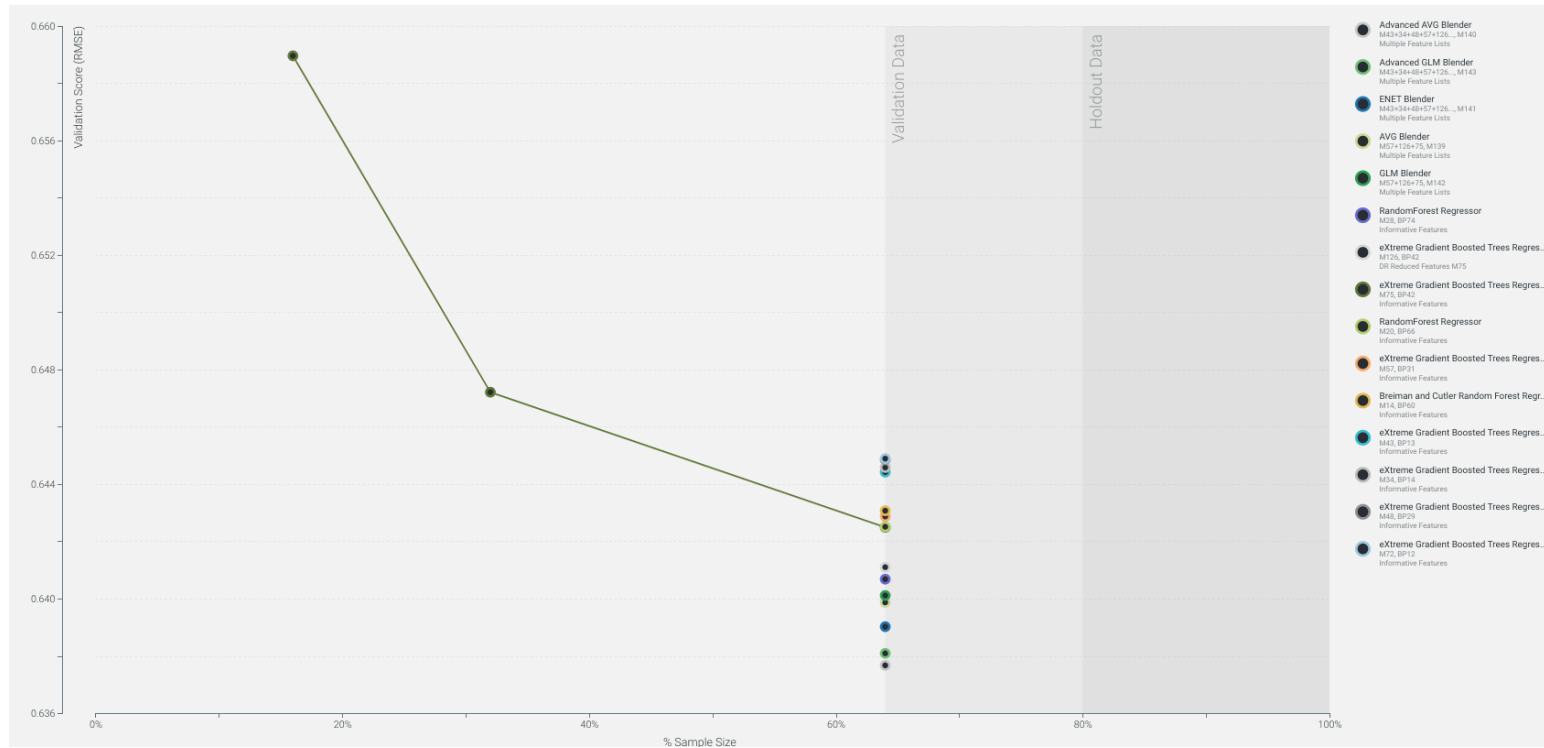
**i Top 10 Strongest Associations**

● "Extraversion (Big5)" & "Openness (Big5)"	+0.681
● "Conscientiousness (Big5)" & "Extraversion (Big5)"	+0.674
● "Conscientiousness (Big5)" & "Openness (Big5)"	+0.673
● "Conscientiousness (... & "Emotional stability (B...	+0.669
● "Emotional stability (Big5)" & "Extraversion (Big5)"	+0.664
● "Emotional stability (Big5)" & "Openness (Big5)"	+0.662
● "Job now" & "Manager experience"	+0.621
● "Job now" & "Work experience"	+0.599
● "Manager experience" & "Work experience"	+0.590
● "Study abroad, total ti... & "Work abroad, total ti...	+0.426

(DataRobot, 2021b)

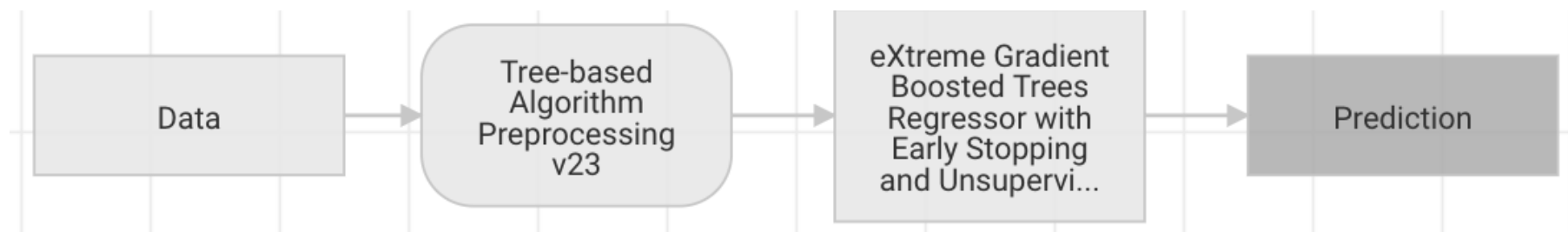


**Figure 6.** *Learning curves* for the created models



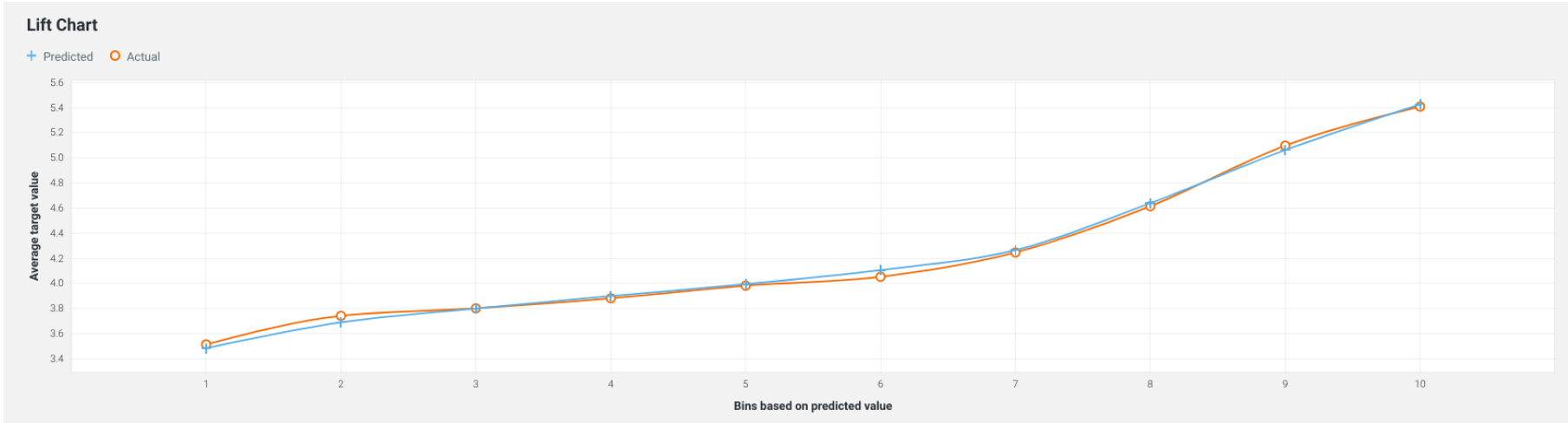
(DataRobot, 2021b)

**Figure 7.** *Blueprint* for model “eXtreme Gradient Boosted Trees Regressor with Early Stopping and Unsupervised Learning Features”



(DataRobot, 2021b)

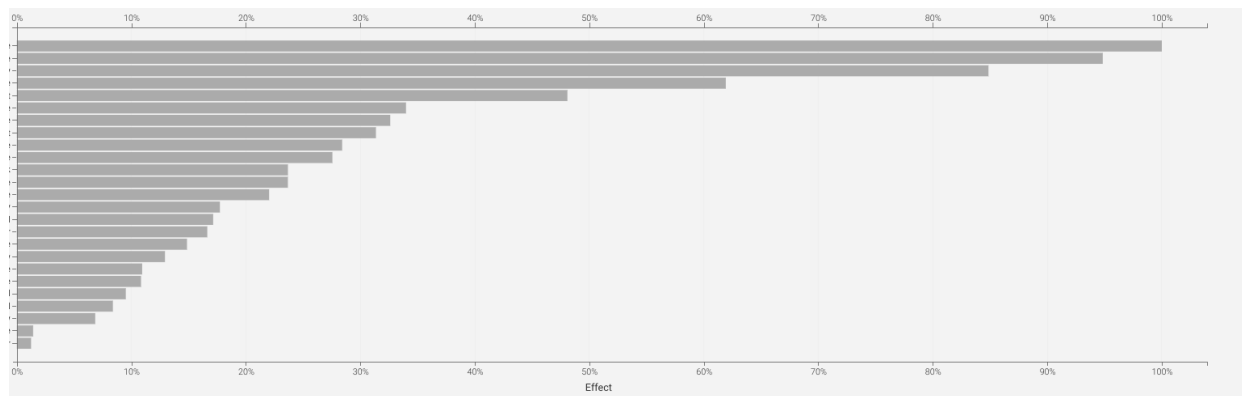
**Figure 8:** *Lift chart* (view the effectiveness) for the chosen model



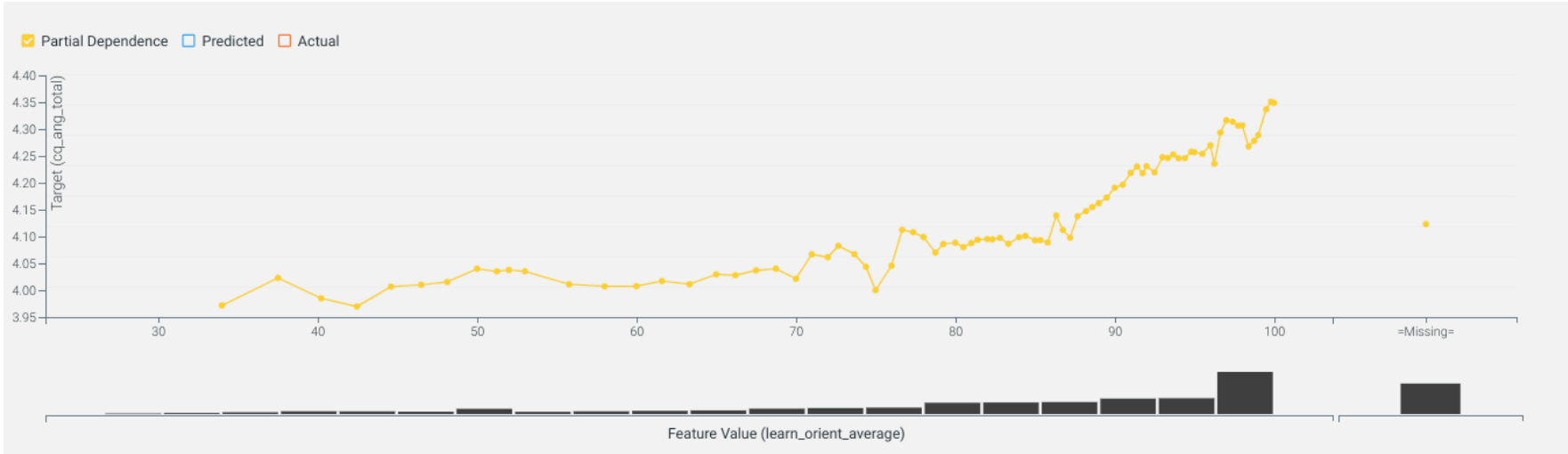
(DataRobot, 2021b)

**Figure 9:** Model of *Feature effects* ranging the chosen features by importance to the target variable (Total CQ value)

Learning orientation	100%
Home country	95%
English language skills	85%
English exam score	62%
International student	48%
Conscientiousness (Big5)	34%
Daily interaction with foreigners	33%
Tourist (total time)	31%
Openness (Big5)	28%
Agreeableness (Big5)	28%
Work abroad (total time)	24%
Extraversion (Big5)	24%
Age	22%
Study abroad (total time)	18%
Grit	17%
Gender	17%
Work experience (total time)	15%
Job now	13%
Manager experience	11%
Extraversion (Big5)	11%
Trust (Propensity to trust strangers)	10%
Education level	9%
Work now	7%
Asked to live abroad	1%
Number of countries lived	1%
Total time as international student	1%
Satisfaction with last international experience	1%
Task performance mentality	0%
Narcissism	0%

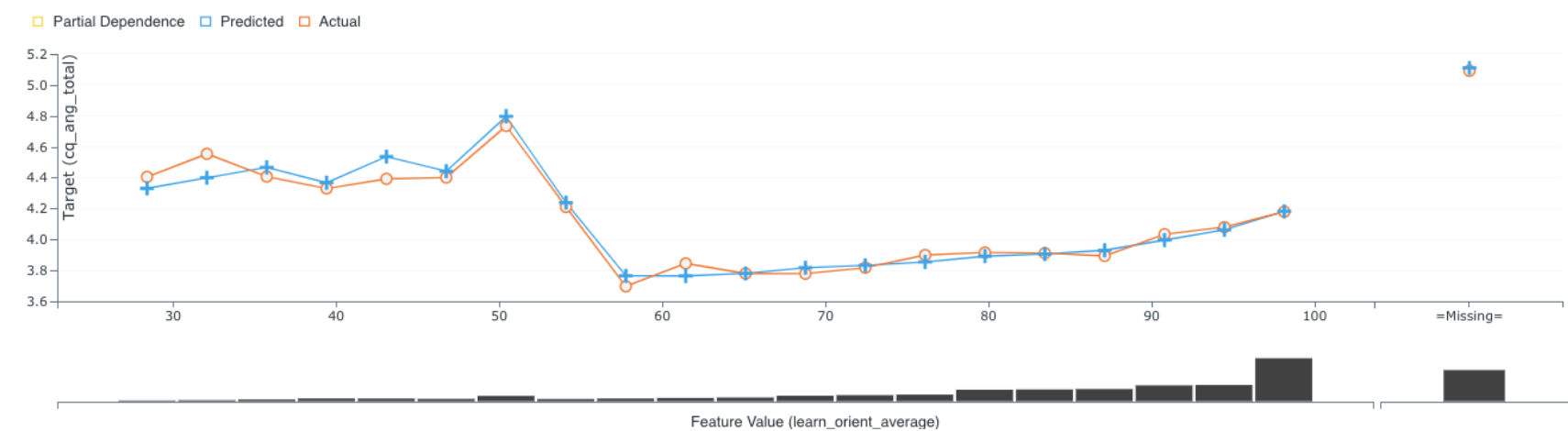


**Figure 10:** *Feature effect (partial dependence curve) on the chosen model for variable **Learning orientation***



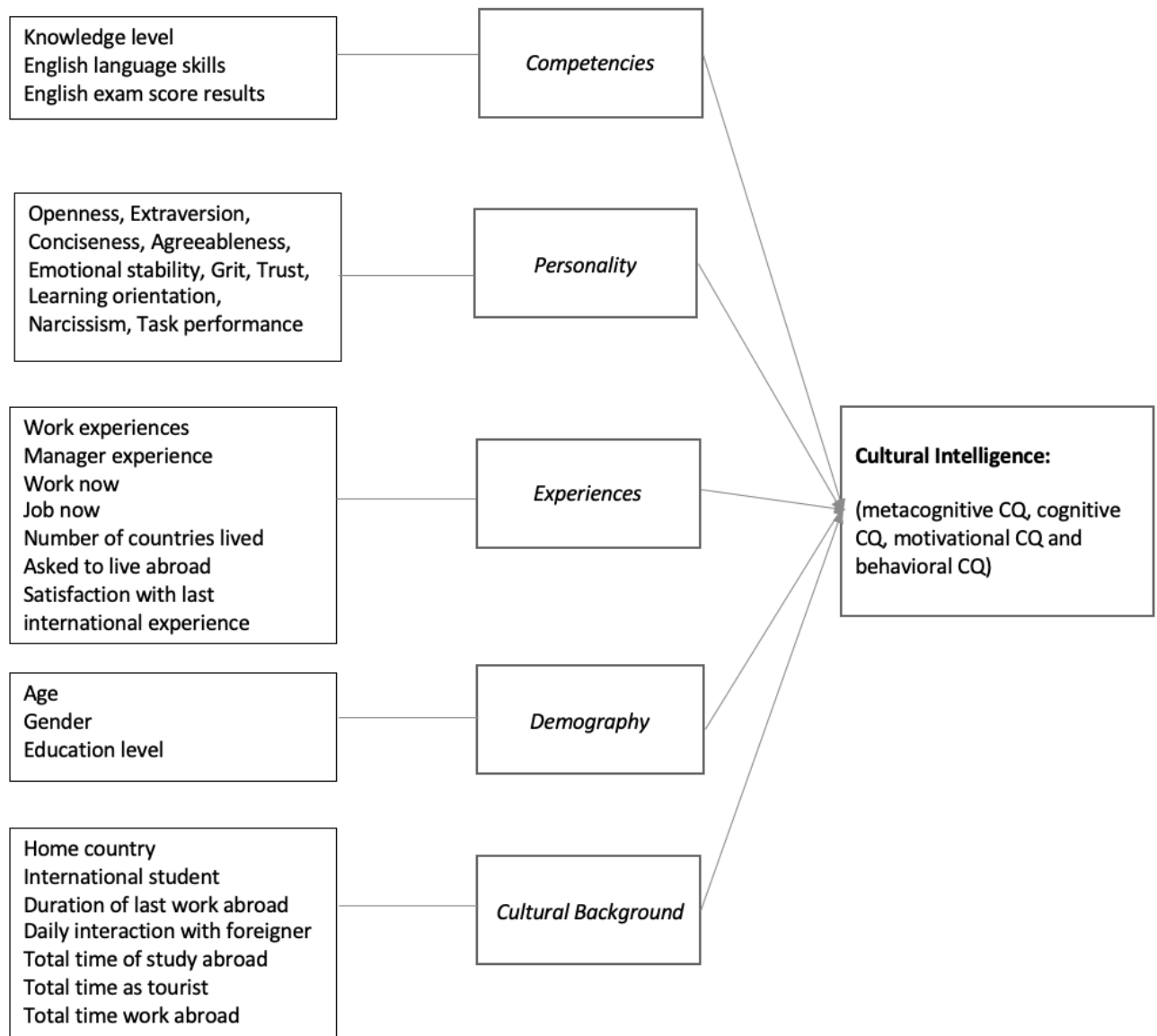
(DataRobot, 2021b)

**Figure 11:** *Feature fit* (actual and predicted) on the chosen model for variable *Learning orientation*

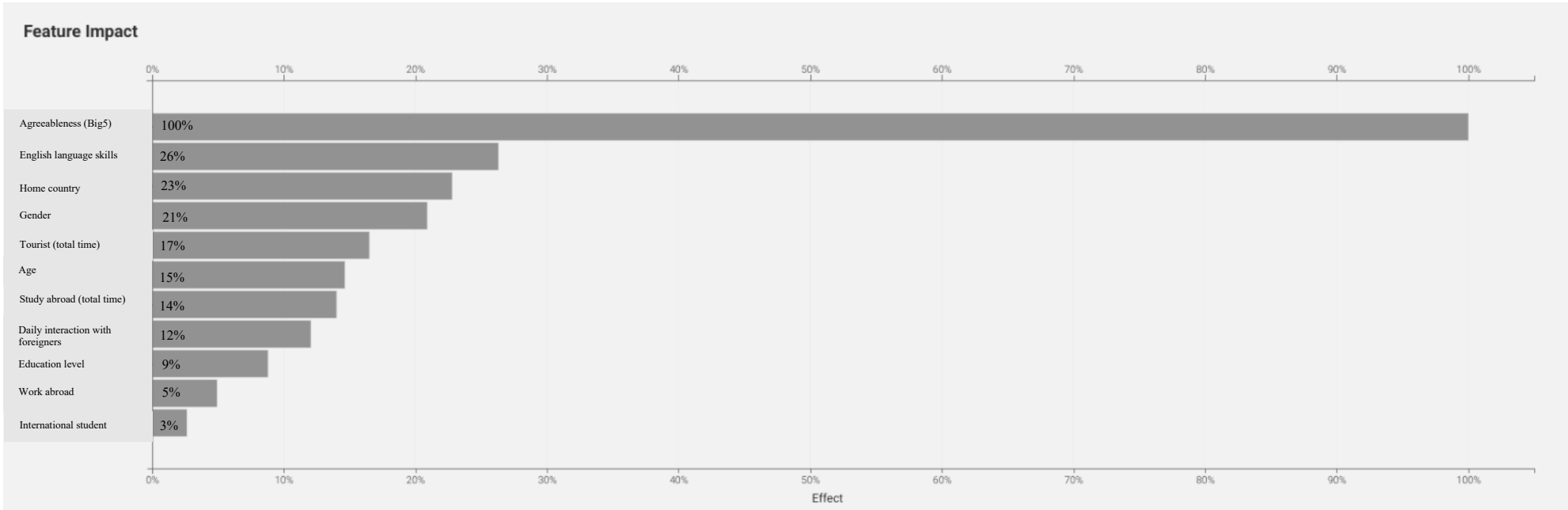


(DataRobot, 2021b)

**Figure 12:** Demonstration of the different variables tested for each of the five categories

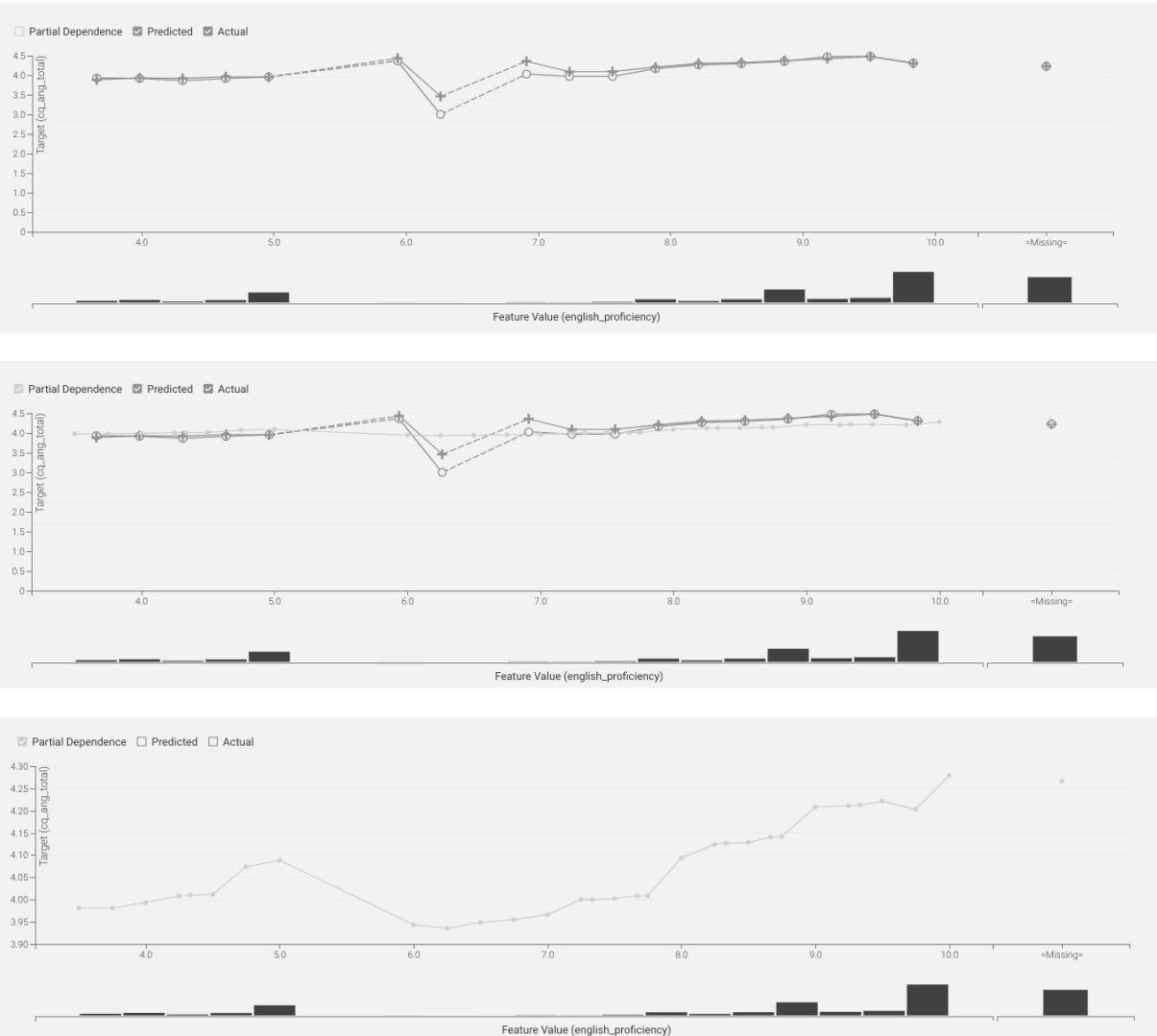


**Figure 13:** Feature impact for *CQ knowledge*



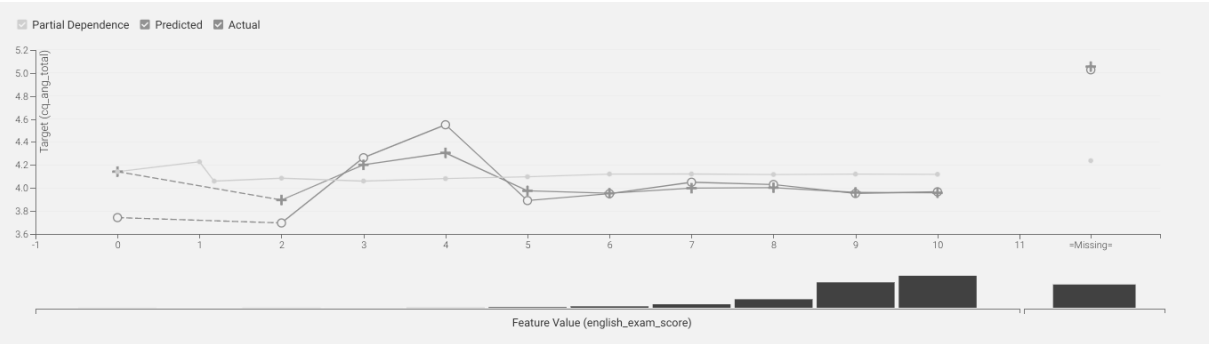
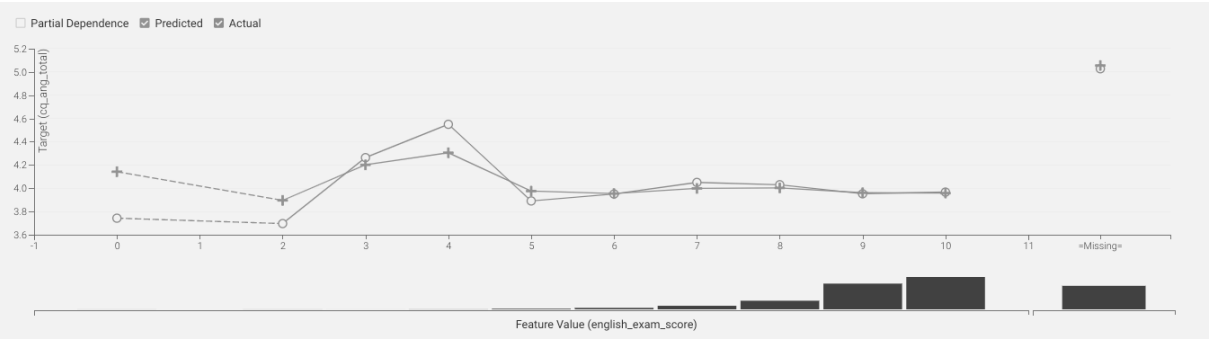
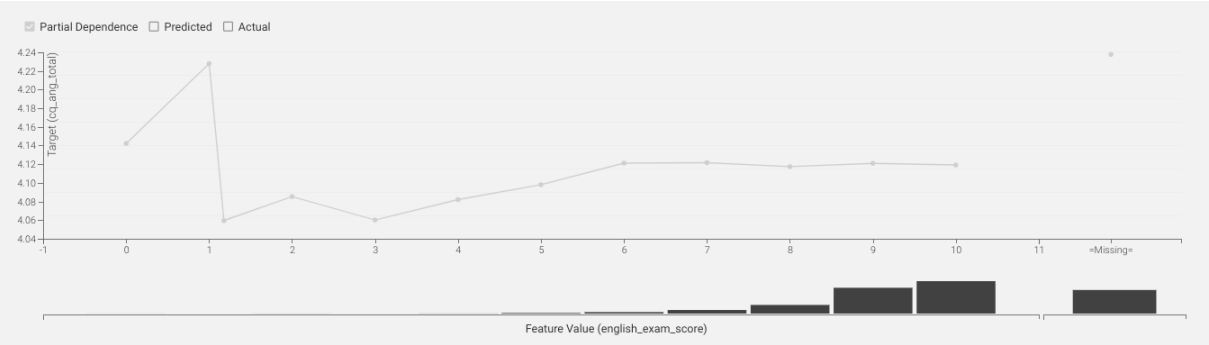


**Figure 14:** Feature effect of *English language skills*



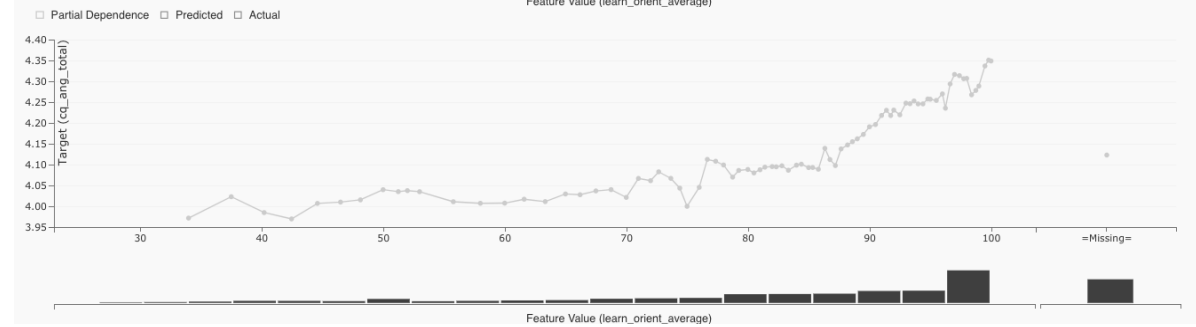
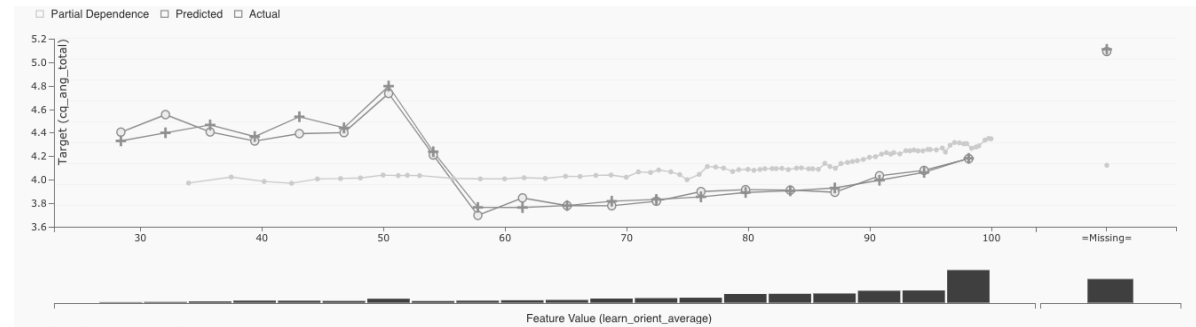
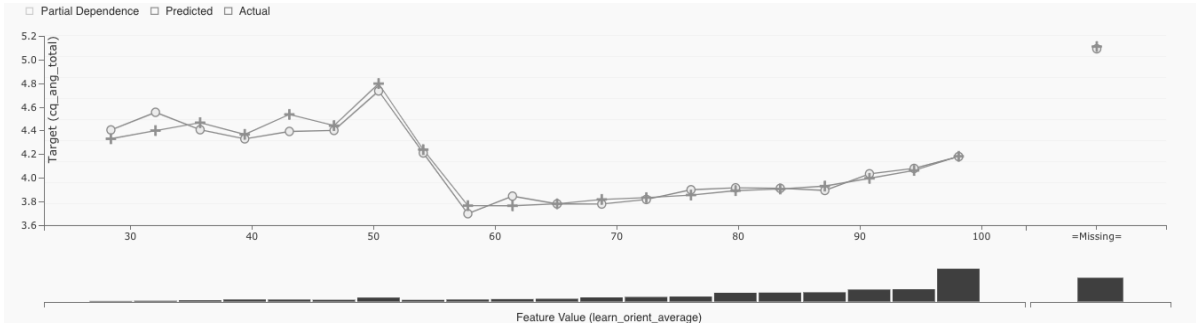
Mean Predicted	Mean Actual
3,88	3,93
3,93	3,92
3,92	3,86
3,96	3,92
3,95	3,96
4,43	4,36
3,46	3,00
4,36	4,03
4,09	3,97
4,10	3,97
4,21	4,16
4,30	4,27
4,32	4,30
4,37	4,35
4,42	4,47
4,48	4,48
4,30	4,31
4,23	4,23

Figure 15: Feature effect *English exam score*



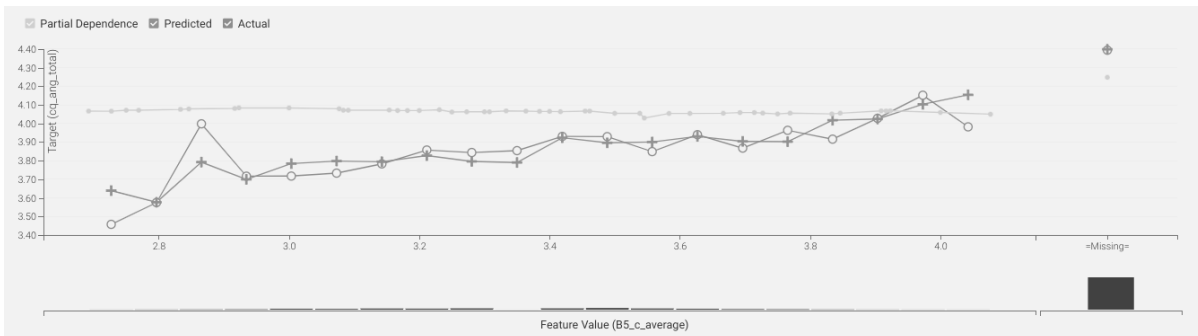
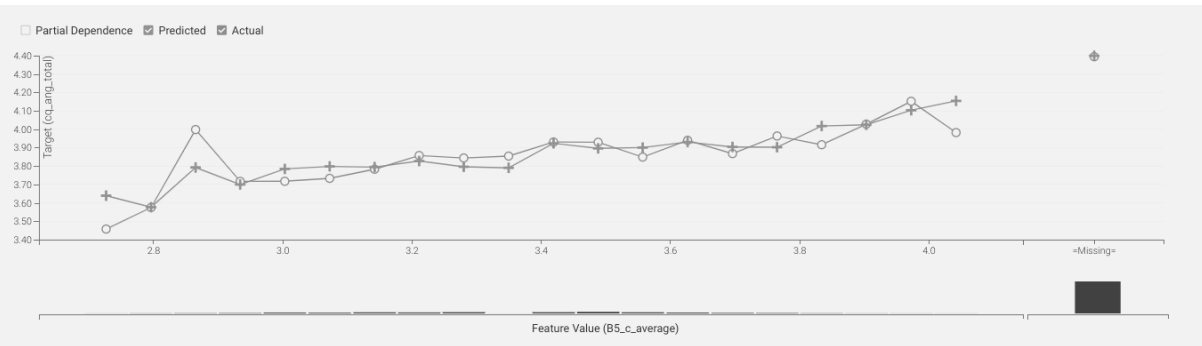
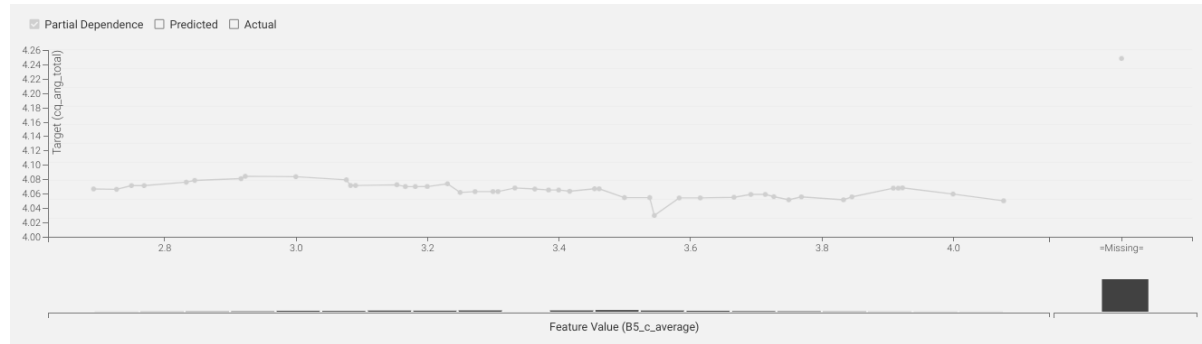
Mean Predicted	Mean Actual
4,14	3,74
3,90	3,70
4,20	4,26
4,31	4,55
3,98	3,89
3,95	3,95
4,00	4,05
4,00	4,03
3,96	3,95
3,96	3,97
5,06	5,03

**Figure 16:** Feature effect *Learning Orientation*



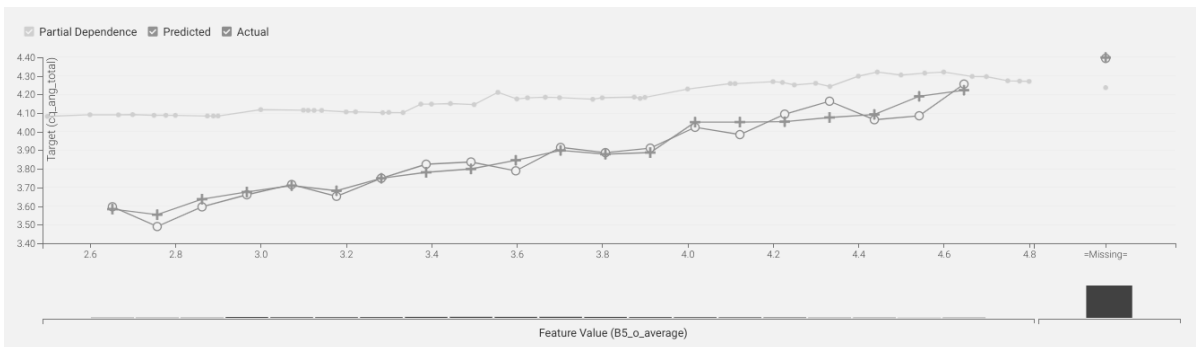
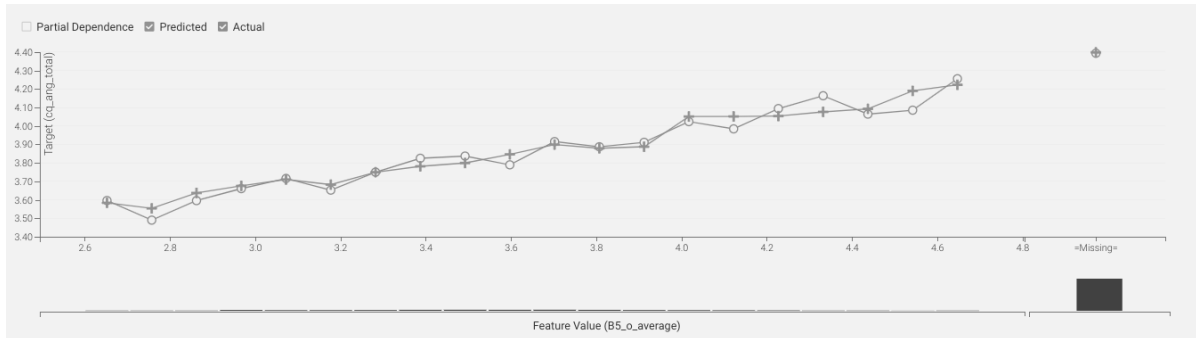
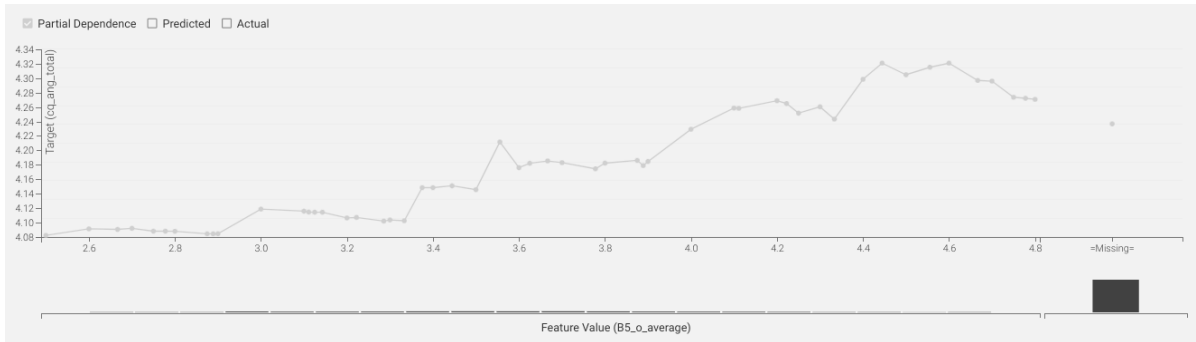
Mean Predicted	Mean Actual
4,330	4,405
4,399	4,554
4,466	4,407
4,367	4,330
4,536	4,392
4,441	4,401
4,797	4,735
4,239	4,210
3,764	3,697
3,764	3,845
3,780	3,779
3,817	3,778
3,832	3,817
3,854	3,899
3,892	3,915
3,906	3,911
3,930	3,893
3,996	4,034
4,063	4,079
4,182	4,179
5,110	5,091
4,165	4,160

**Figure 17:** Feature effect *Consciousness*



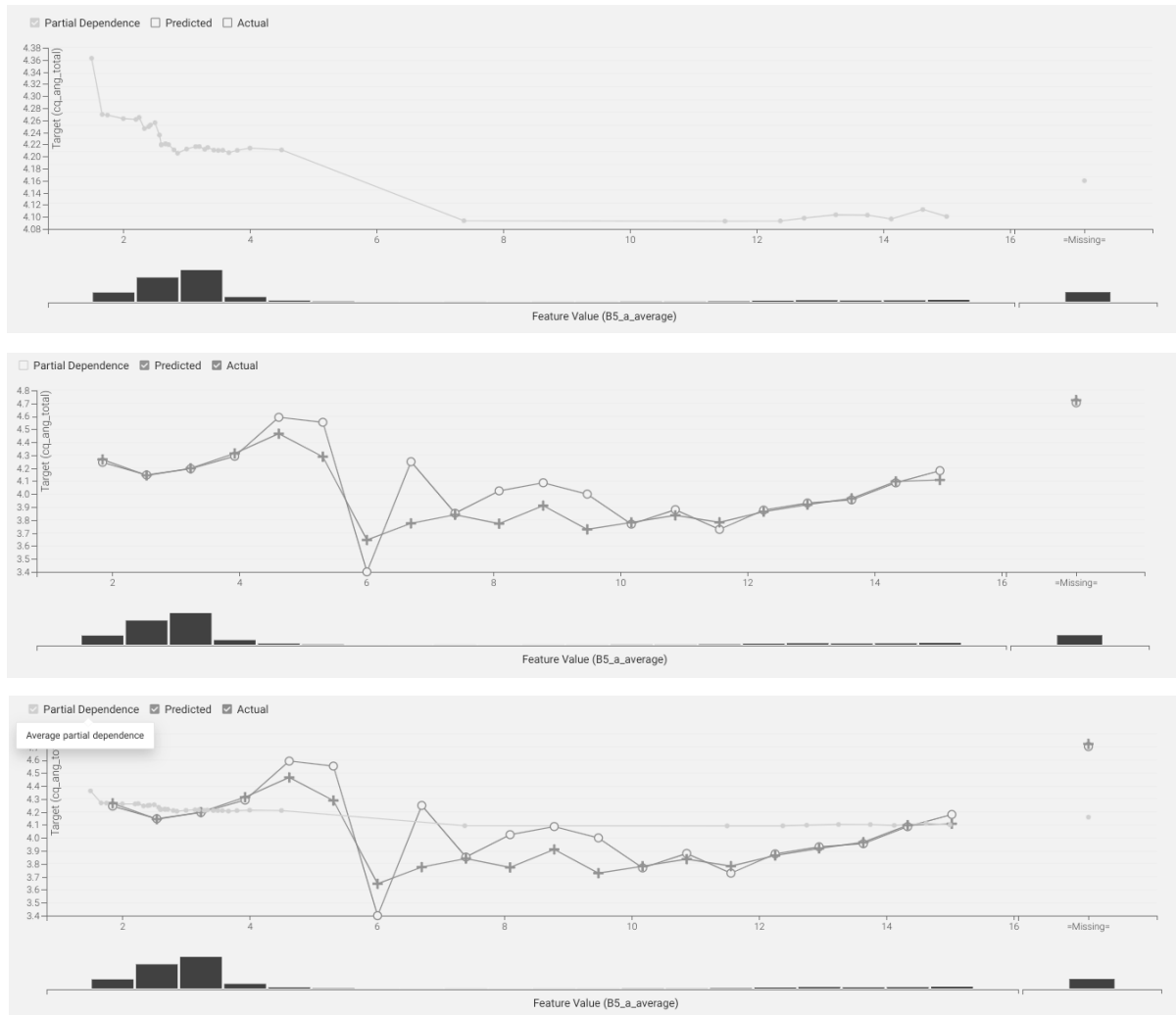
Mean Predicted	Mean Actual
3,639	3,458
3,577	3,575
3,792	3,998
3,700	3,717
3,785	3,717
3,798	3,733
3,795	3,783
3,827	3,857
3,796	3,844
3,790	3,854
3,923	3,931
3,896	3,929
3,901	3,849
3,931	3,940
3,904	3,868
3,902	3,963
4,018	3,916
4,025	4,028
4,103	4,152
4,154	3,982
4,399	4,394

**Figure 18:** Feature effect *Openness*



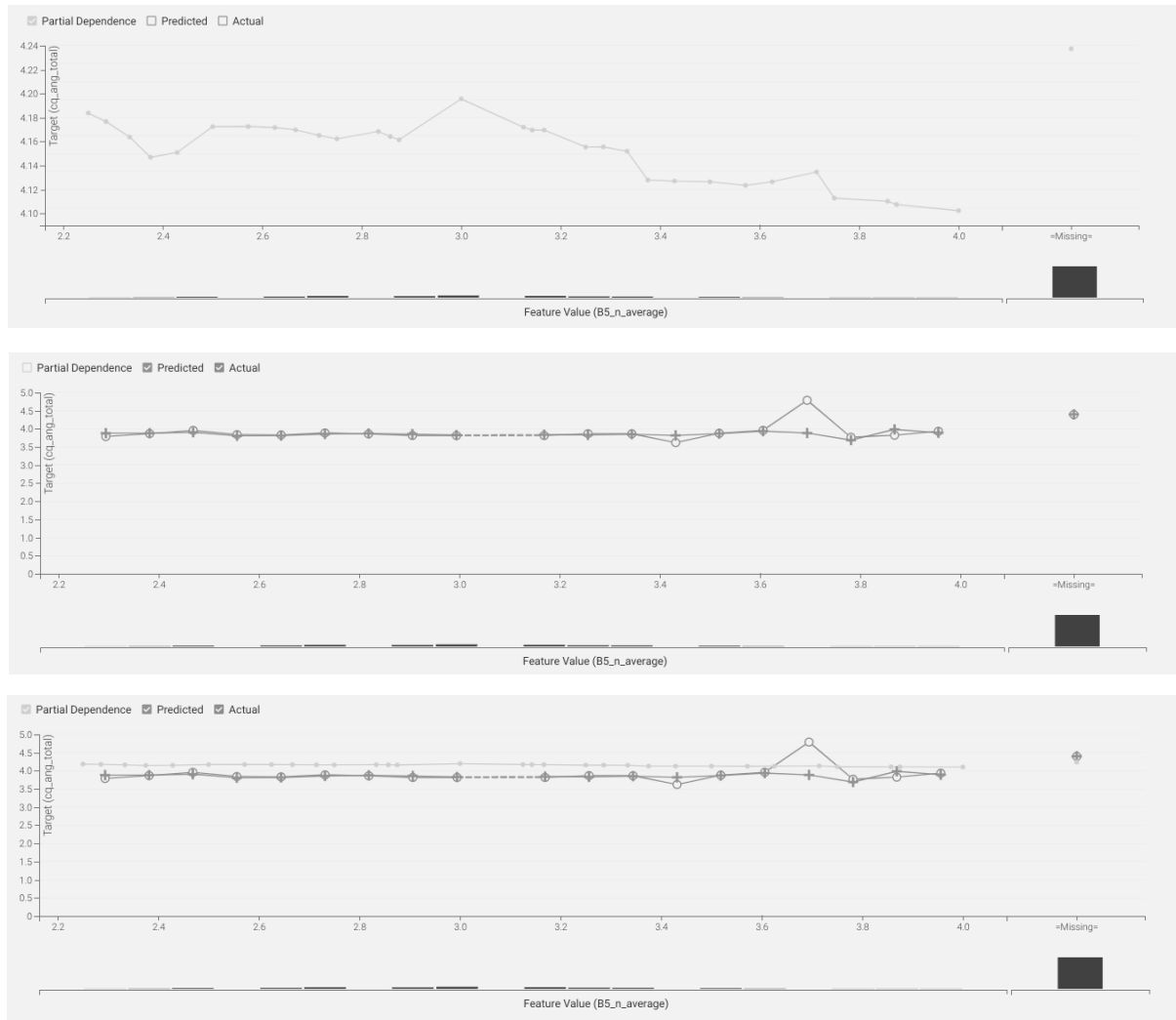
Mean Predicted	Mean Actual
3,584	3,596
3,554	3,490
3,637	3,596
3,676	3,661
3,710	3,716
3,682	3,653
3,750	3,750
3,782	3,825
3,800	3,837
3,846	3,790
3,899	3,915
3,879	3,888
3,888	3,912
4,051	4,024
4,052	3,984
4,054	4,094
4,077	4,164
4,093	4,064
4,190	4,086
4,223	4,256
4,399	4,394

**Figure 19:** Feature effect *Agreeableness*



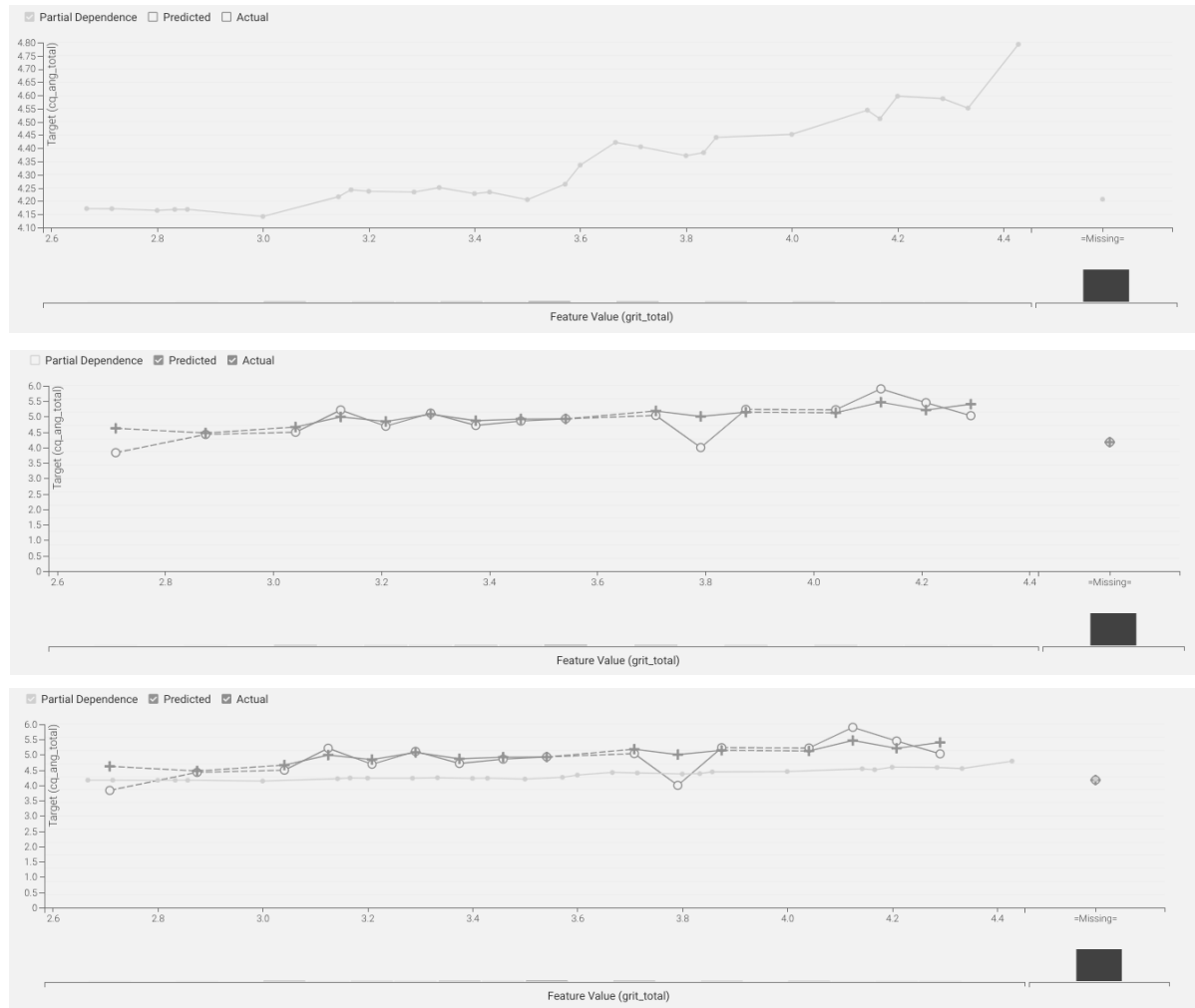
Mean Predicted	Mean Actual
4,267	4,245
4,144	4,147
4,199	4,196
4,313	4,292
4,466	4,593
4,288	4,554
3,646	3,400
3,774	4,250
3,841	3,852
3,772	4,025
3,911	4,088
3,728	4,000
3,781	3,768
3,836	3,880
3,782	3,728
3,864	3,877
3,919	3,931
3,966	3,955
4,098	4,087
4,109	4,180
4,725	4,705

**Figure 20:** Feature effect *Emotional stability*



Mean Predicted	Mean Actual
3,881	3,788
3,881	3,869
3,907	3,957
3,806	3,842
3,816	3,832
3,858	3,888
3,875	3,861
3,857	3,816
3,828	3,815
3,839	3,815
3,833	3,867
3,850	3,864
3,820	3,622
3,870	3,879
3,937	3,959
3,885	4,789
3,690	3,768
3,986	3,825
3,893	3,934
4,399	4,394

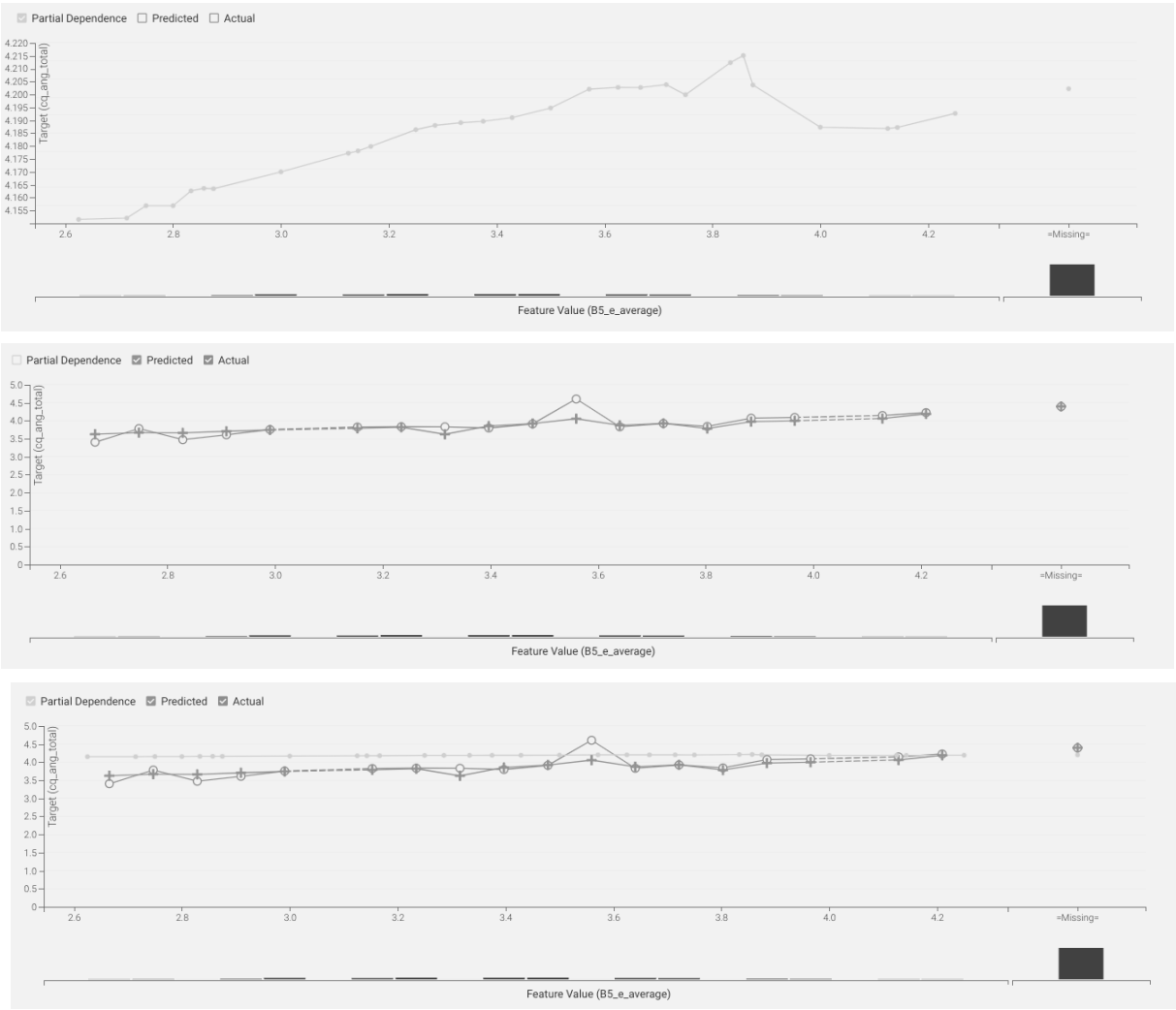
**Figure 21:** Feature effect *Grit*



Mean Predicted	Mean Actual
4,624	3,835
4,472	4,425
4,664	4,497
4,993	5,217
4,846	4,693
5,080	5,113
4,871	4,717
4,925	4,860
4,928	4,933
5,185	5,040
5,008	4,000
5,148	5,235
5,126	5,224
5,469	5,900
5,215	5,452
5,405	5,032
4,175	4,175

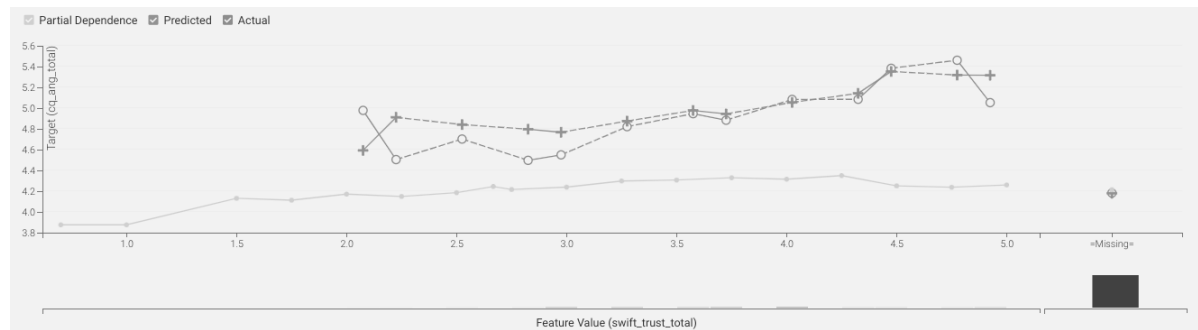
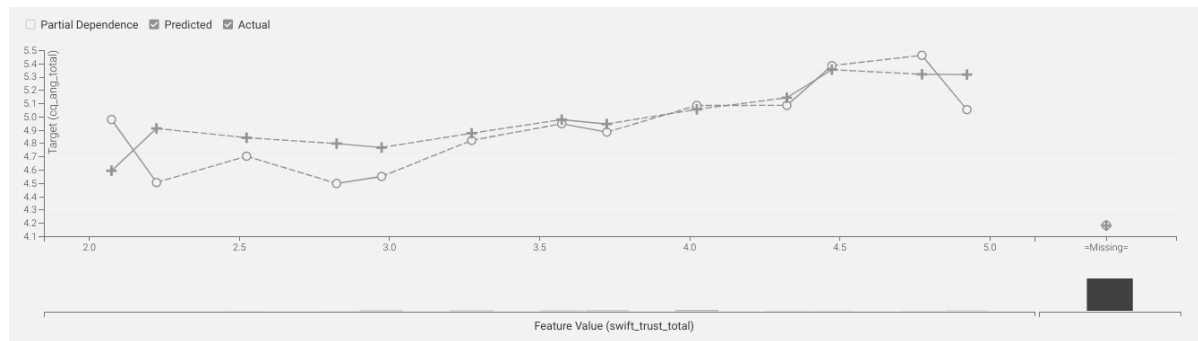
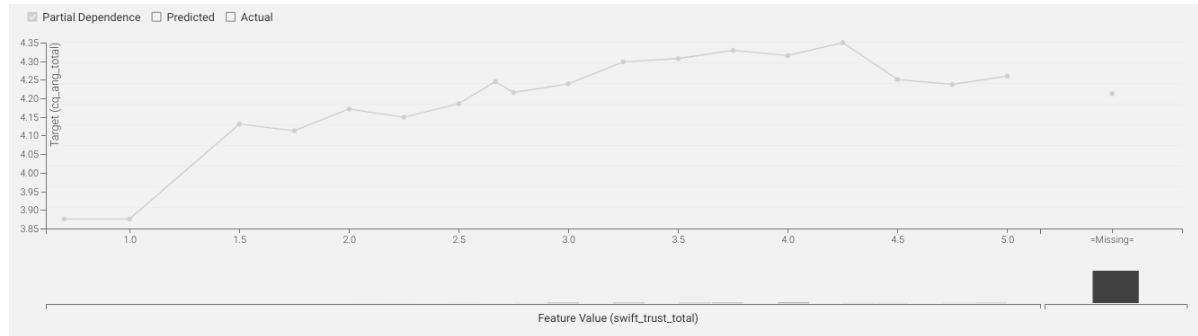


Figure 22: Feature effect *Extraversion*



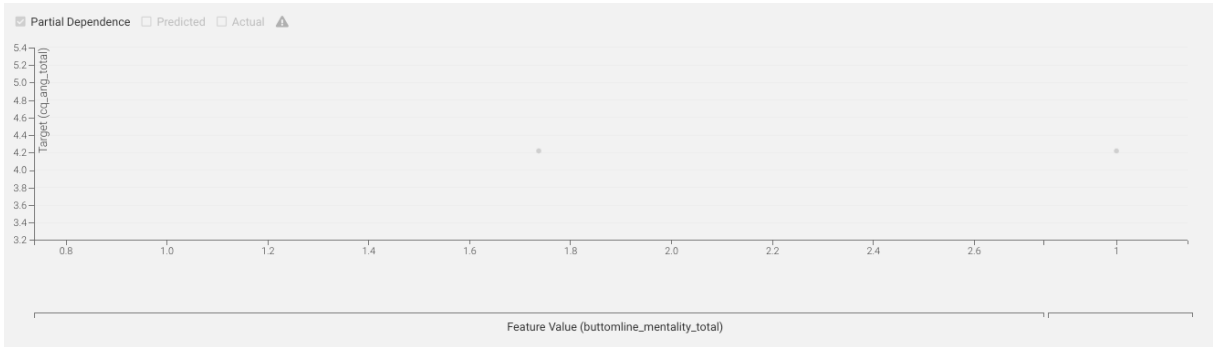
Mean Predicted	Mean Actual
3,626	3,405
3,669	3,783
3,663	3,474
3,707	3,610
3,745	3,755
3,789	3,825
3,821	3,834
3,624	3,832
3,854	3,799
3,923	3,914
4,057	4,607
3,874	3,832
3,928	3,925
3,784	3,842
3,976	4,073
4,001	4,092
4,062	4,146
4,190	4,227
4,399	4,394

**Figure 23:** Feature effect *Trust* (Propensity to trust strangers)



Mean Predicted	Mean Actual
4,593	4,978
4,911	4,504
4,841	4,702
4,797	4,497
4,767	4,550
4,875	4,821
4,977	4,946
4,944	4,883
5,055	5,084
5,142	5,085
5,353	5,383
5,318	5,461
5,316	5,053
4,180	4,182

**Figure 24:** Feature effect *Task performance*



**Figure 25:** Feature effect *Narcissism*

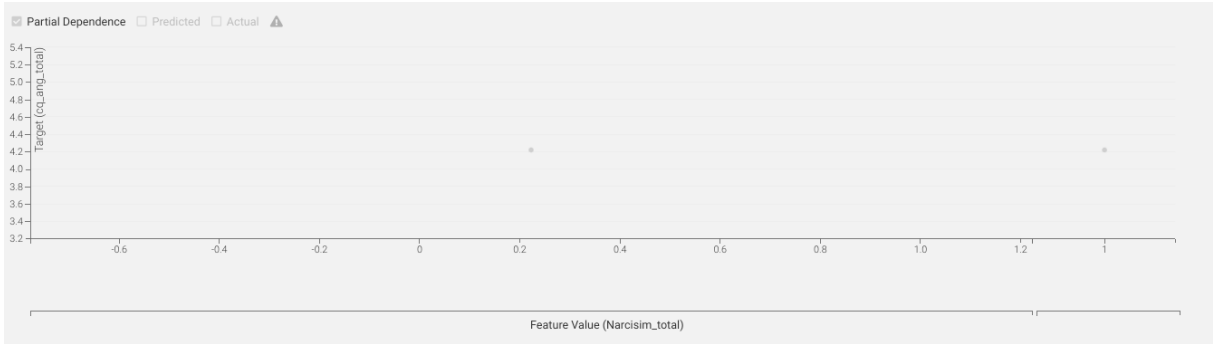
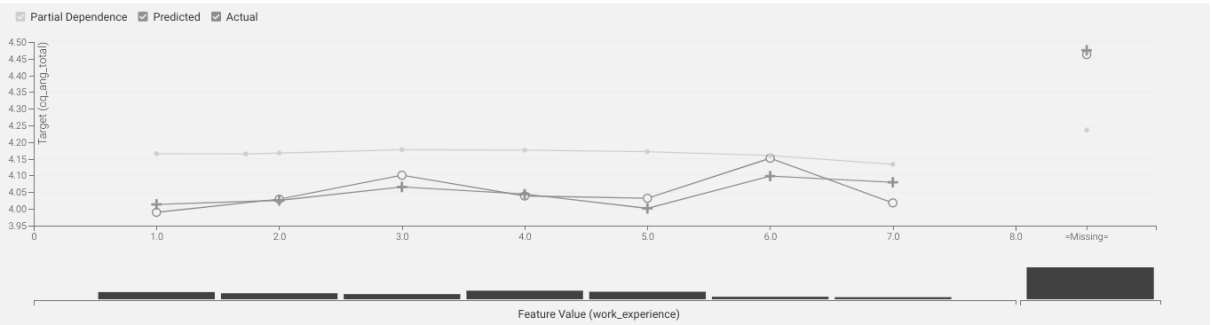
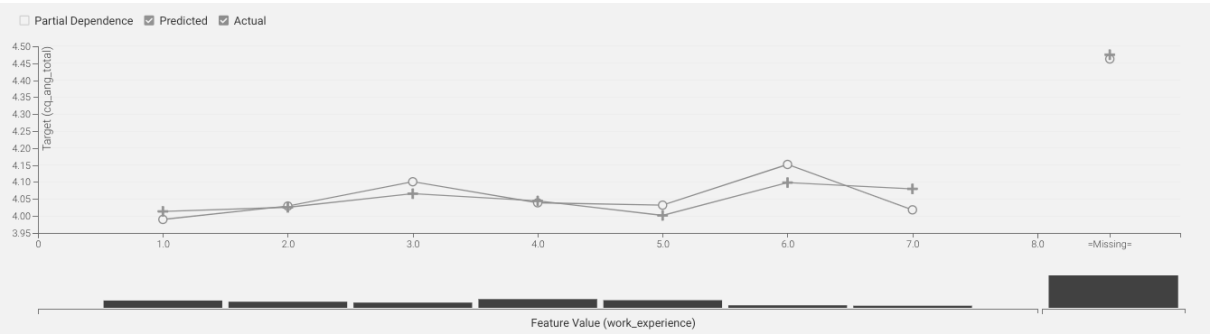
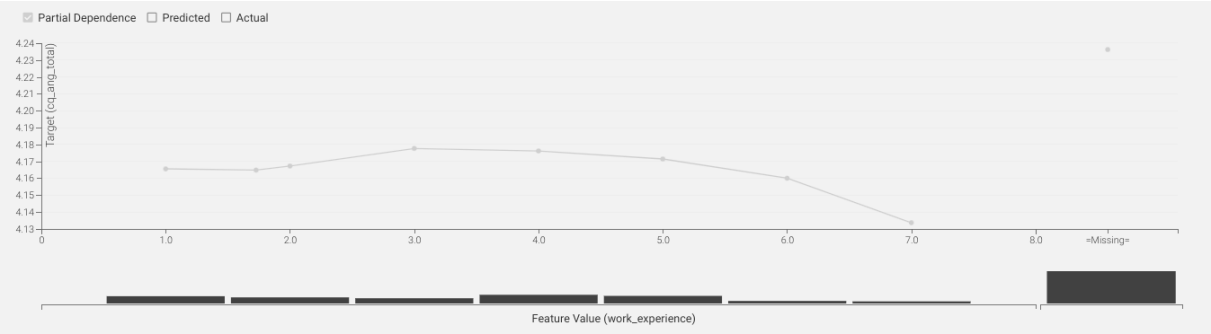
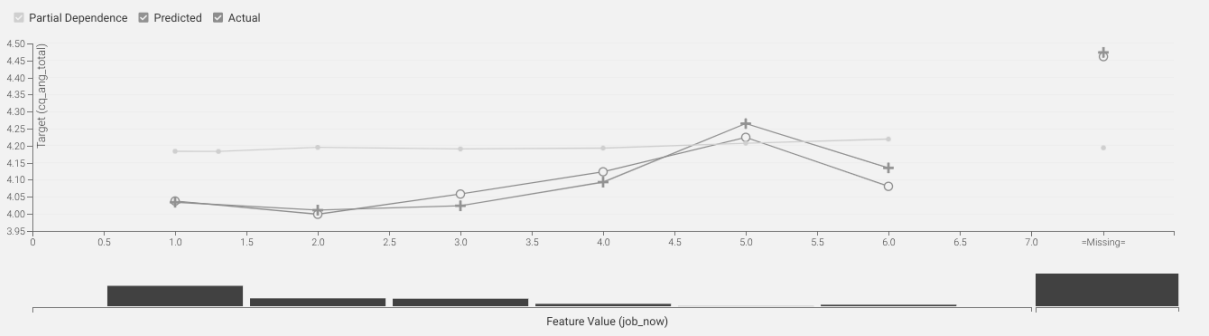
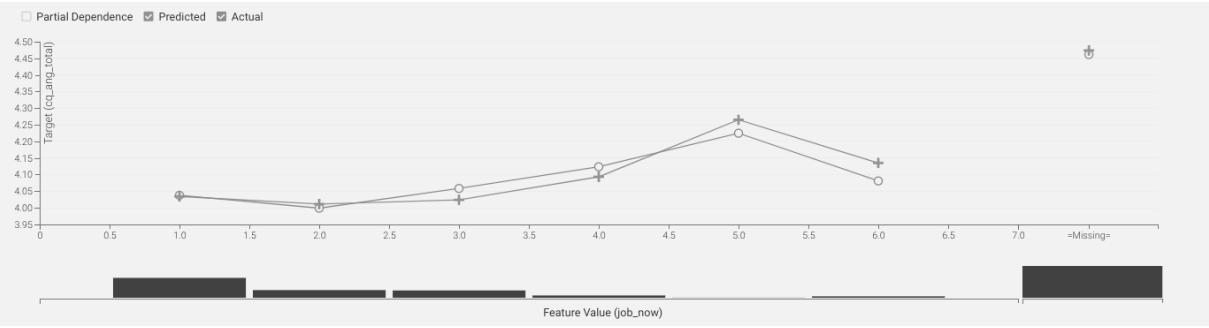
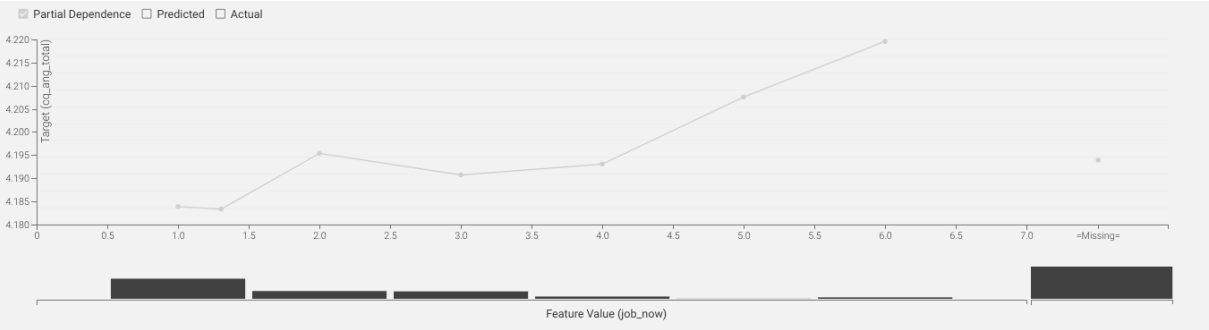


Figure 26: Feature effect *Work experience*



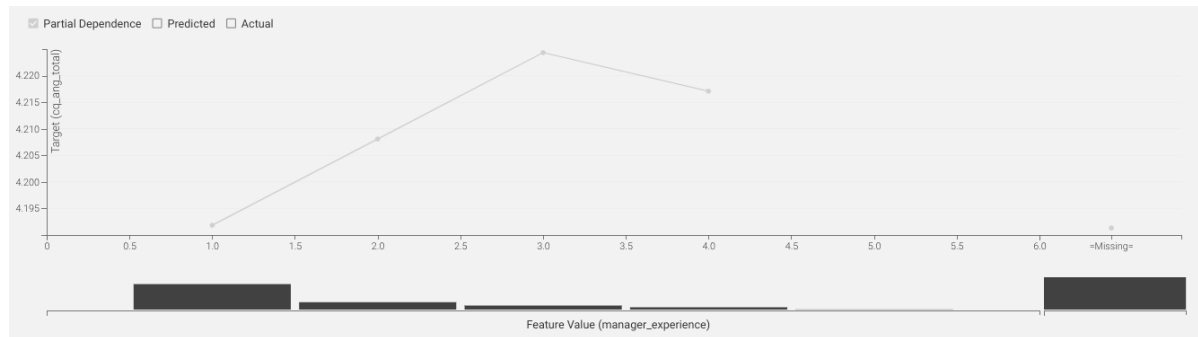
Mean Predicted	Mean Actual
4,014	3,990
4,026	4,029
4,066	4,101
4,044	4,039
4,002	4,032
4,098	4,152
4,080	4,018
4,475	4,463

Figure 27: Feature effect *Job now*



Mean Predicted	Mean Actual
4,034	4,038
4,011	3,999
4,024	4,058
4,093	4,124
4,265	4,225
4,135	4,081
4,474	4,461

**Figure 28:** Feature effect *Manager experience*



Mean Predicted	Mean Actual
4,010	4,022
4,082	4,033
4,050	4,095
4,119	4,139
4,289	4,352
4,474	4,462

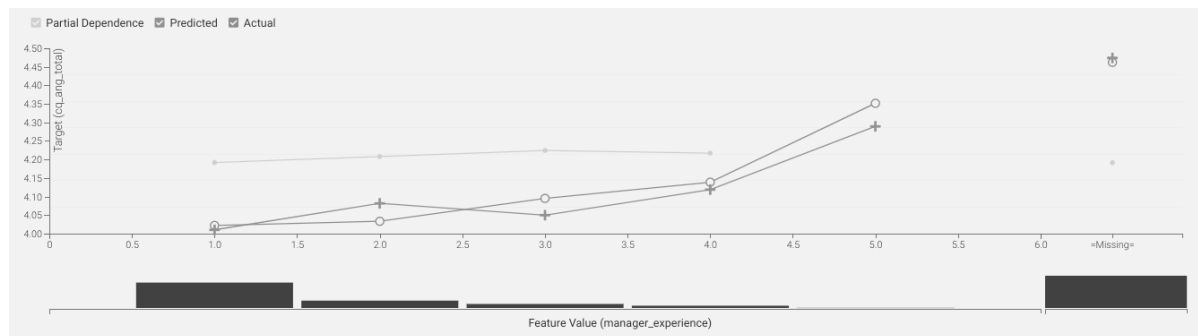
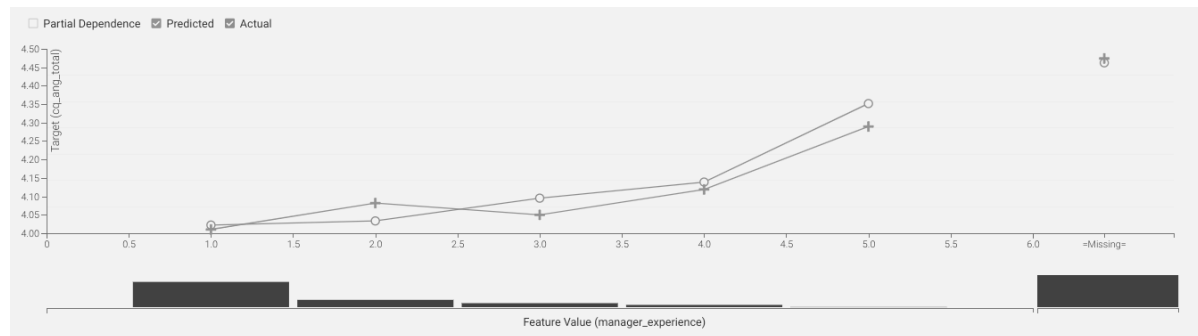
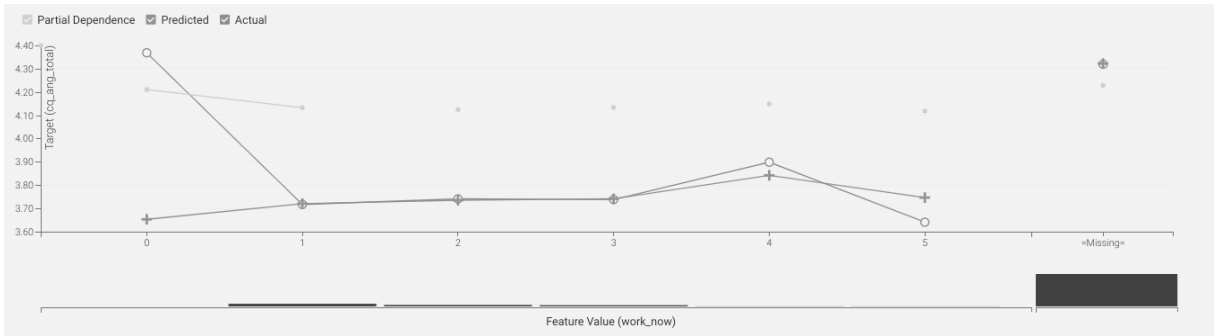
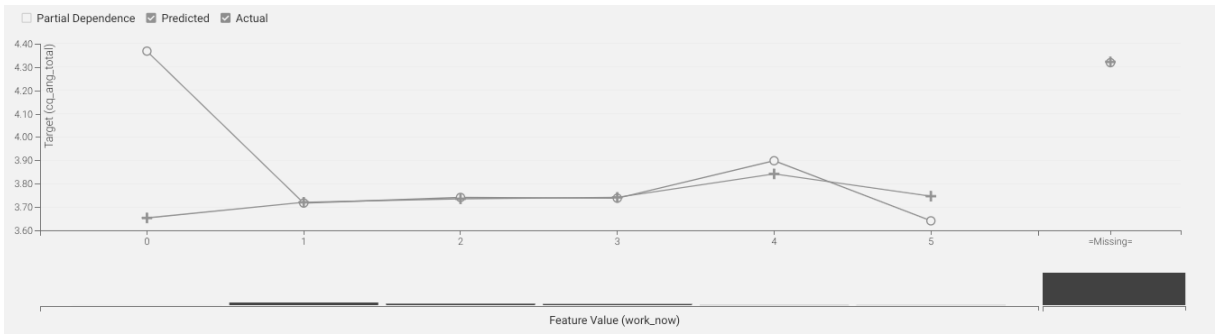
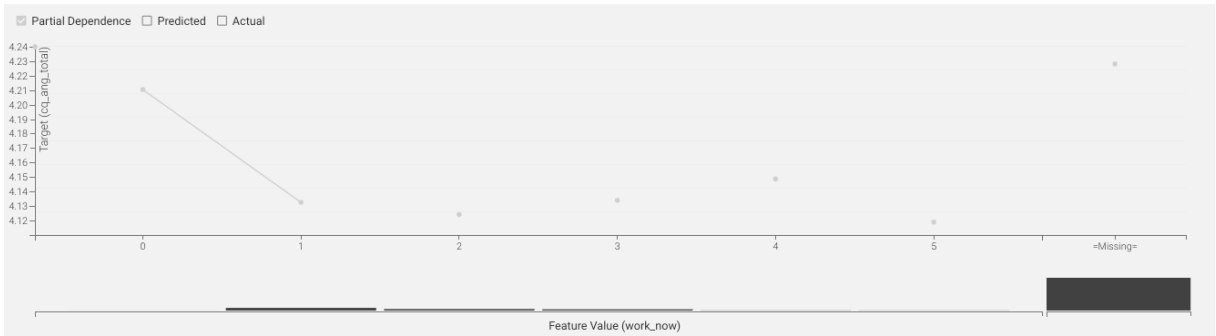


Figure 29: Feature effect *Work now*



Mean Predicted	Mean Actual
3,653	4,368
3,720	3,717
3,735	3,741
3,741	3,738
3,842	3,898
3,746	3,641
4,322	4,319

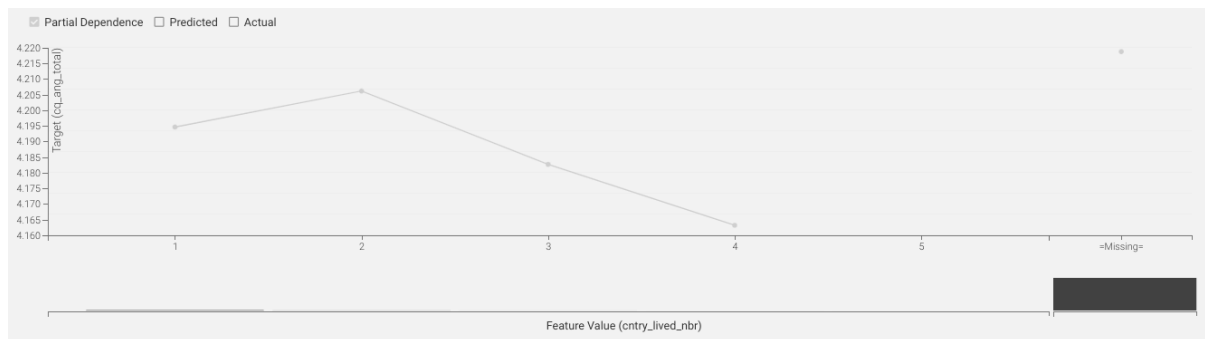


Figure 30: Feature effect *Asked to live abroad*

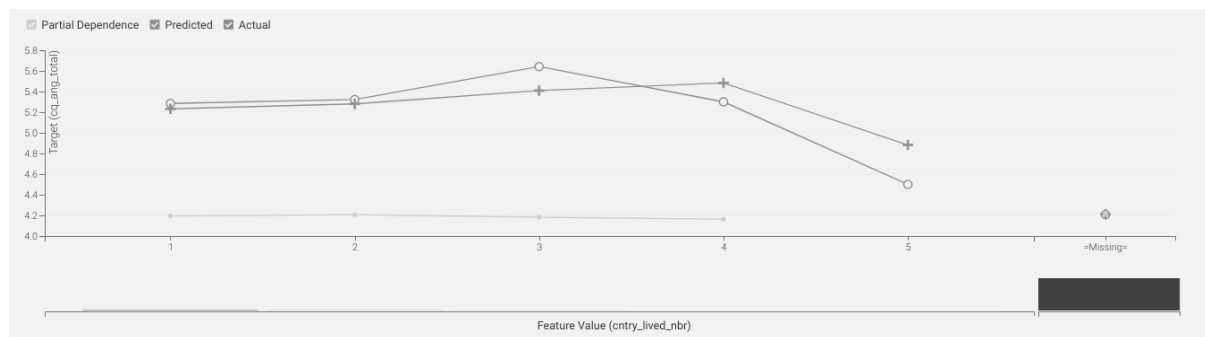
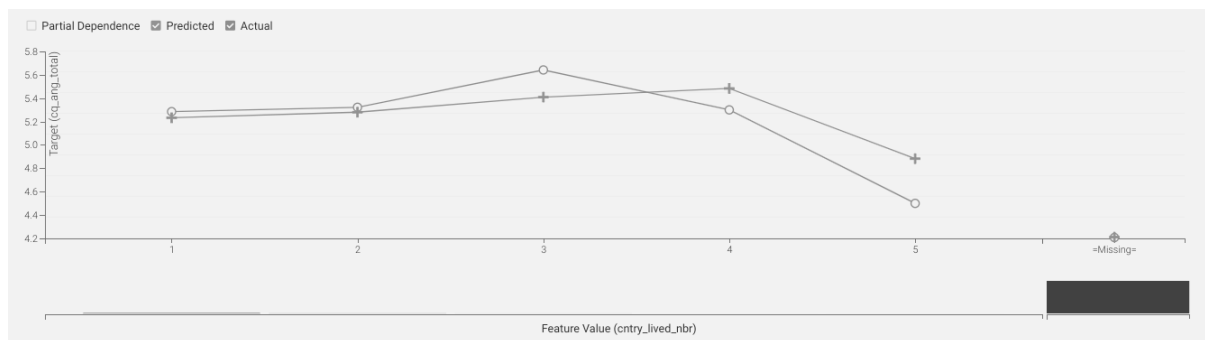


Mean Predicted	Mean Actual
5,171	5,156
5,328	5,247
4,170	4,169

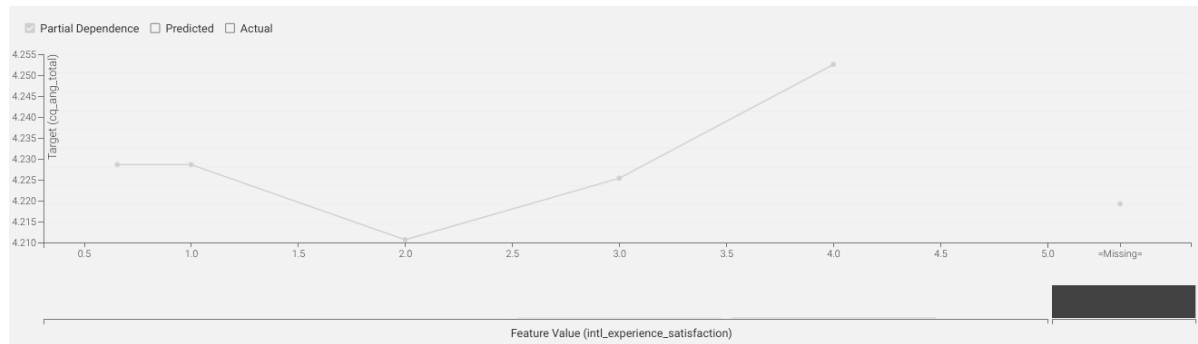
**Figure 31:** Feature effect *Numbers of countries lived*



Mean Predicted	Mean Actual
5,232	5,285
5,280	5,322
5,409	5,642
5,483	5,300
4,882	4,500
4,211	4,208



**Figure 32:** Feature effect *Satisfaction with last experience abroad*

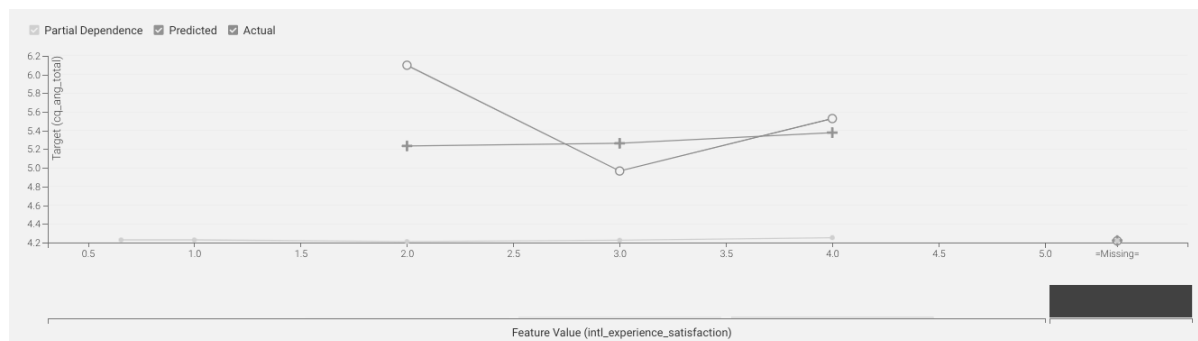
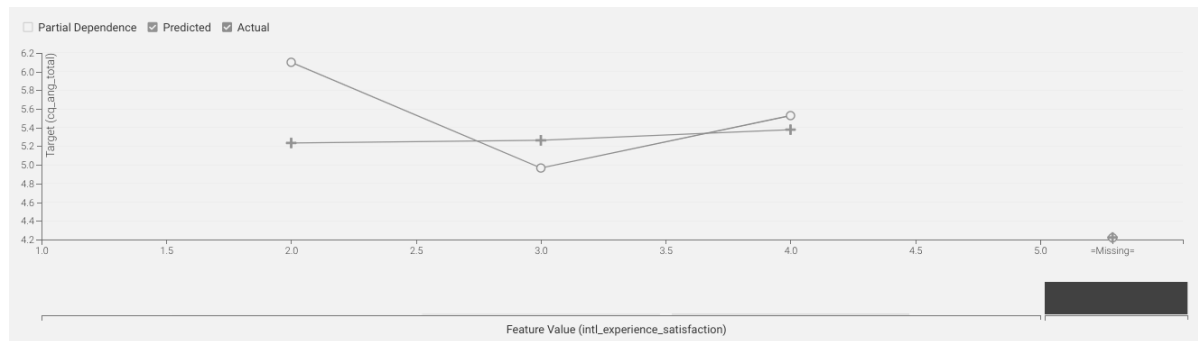


**Mean Predicted**

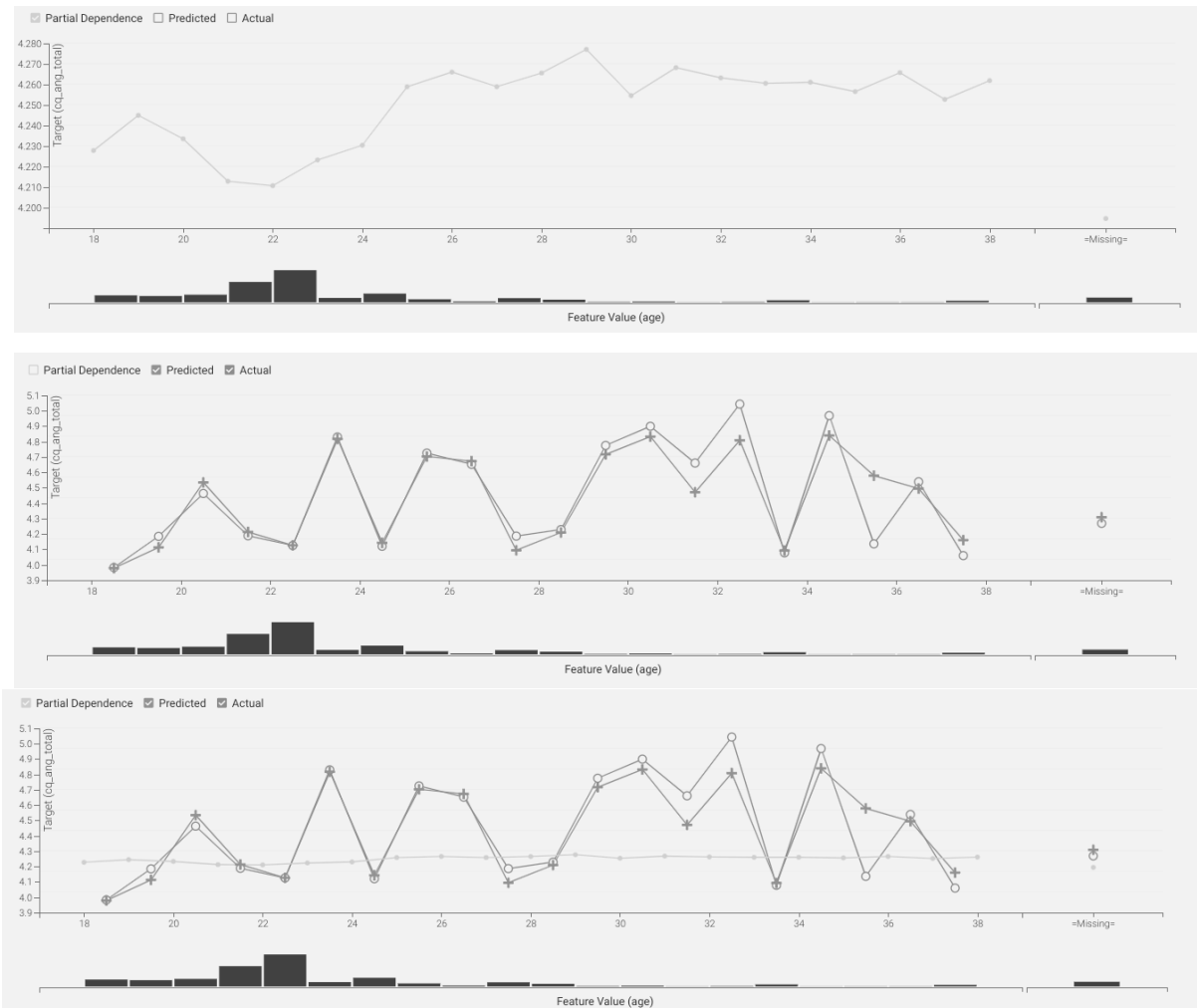
5,235  
5,264  
5,378  
4,222

**Mean Actual**

6,100  
4,967  
5,529  
4,219

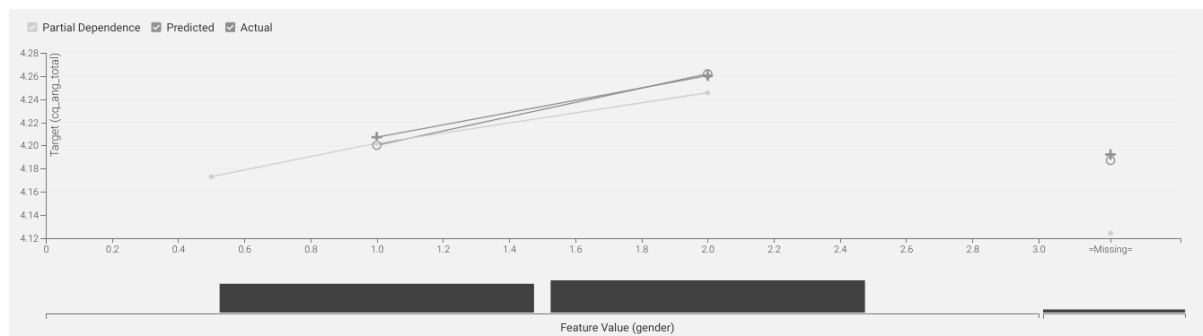
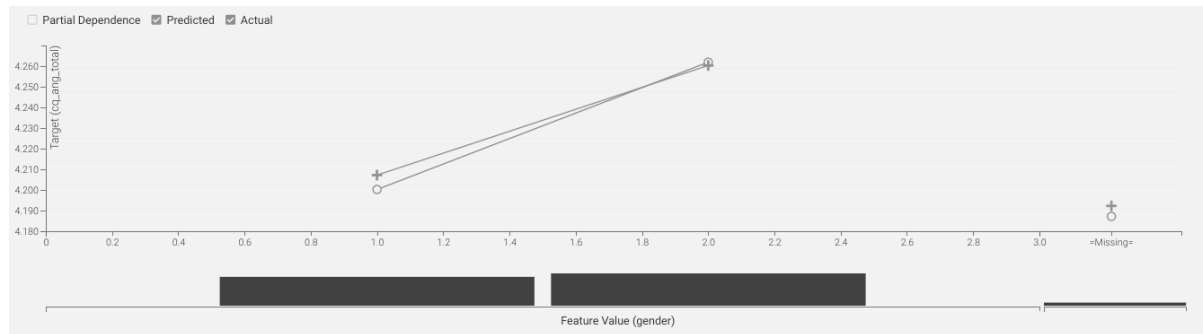
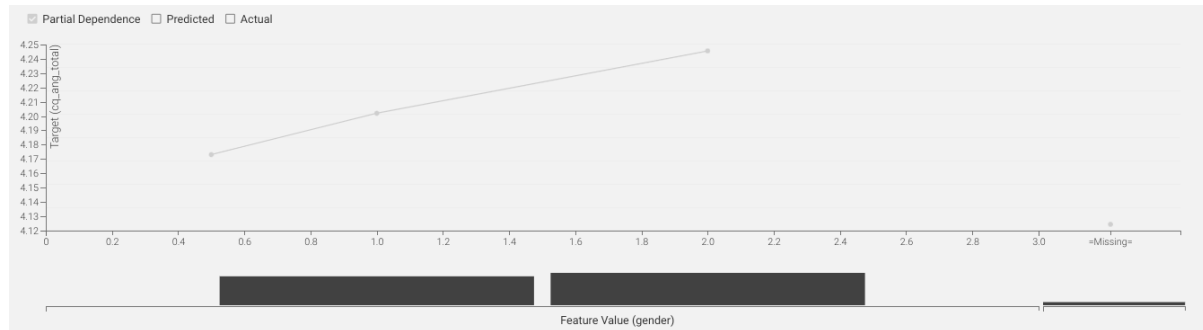


**Figure 33: Feature effect *Age***



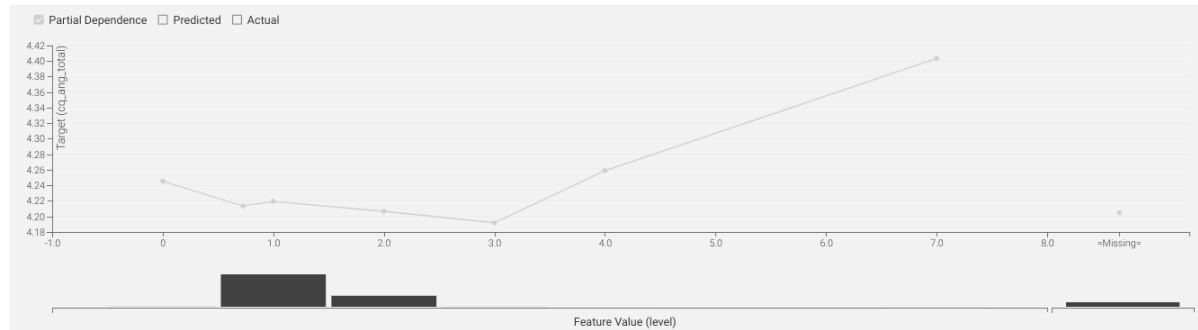
Mean Predicted	Mean Actual
3,979	3,983
4,113	4,185
4,535	4,463
4,214	4,189
4,127	4,126
4,818	4,830
4,143	4,121
4,703	4,726
4,673	4,653
4,094	4,187
4,210	4,229
4,717	4,775
4,832	4,900
4,472	4,661
4,809	5,044
4,093	4,078
4,840	4,969
4,579	4,136
4,495	4,539
4,161	4,060
4,309	4,270

**Figure 34:** Feature effect *Gender*

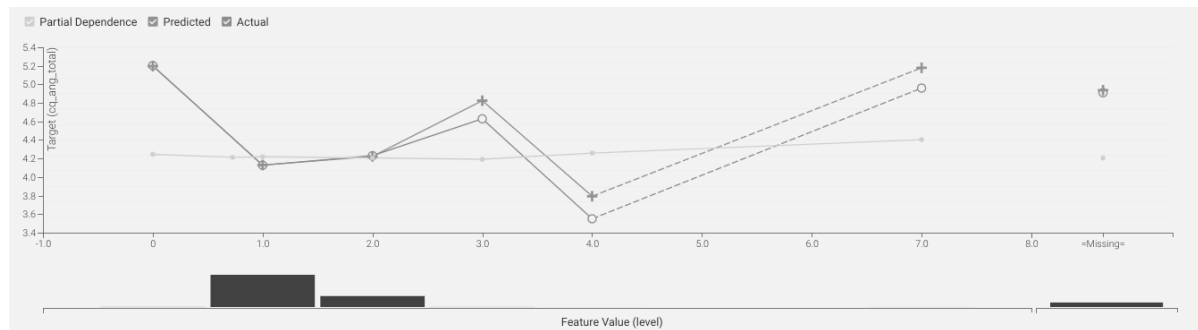
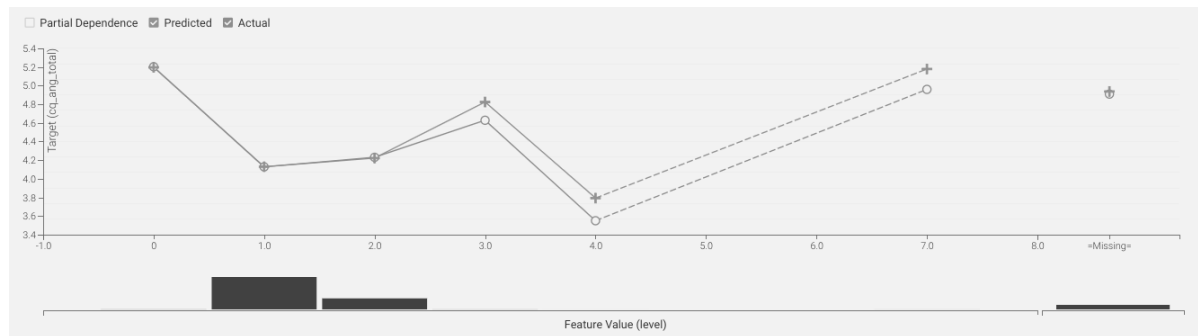


Mean Predicted	Mean Actual
4,207	4,200
4,260	4,262
4,192	4,187

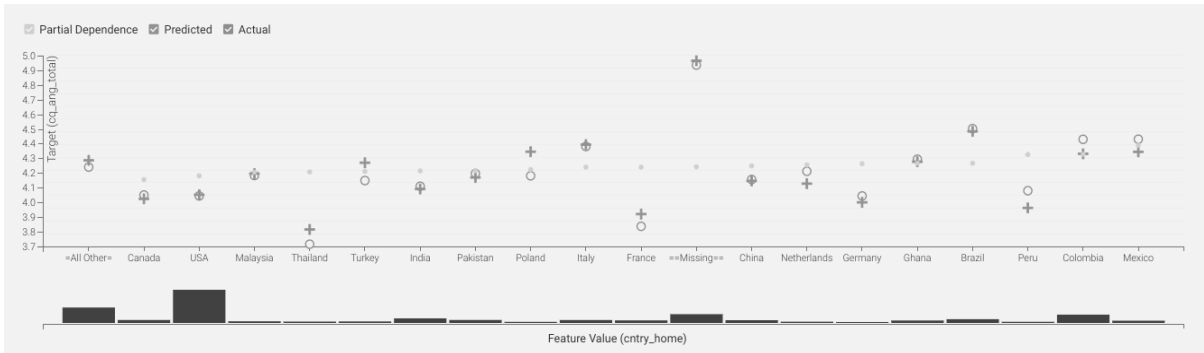
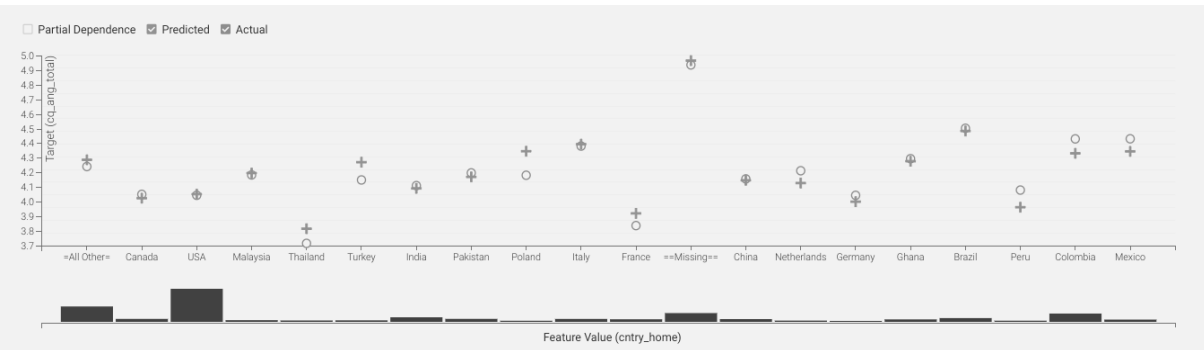
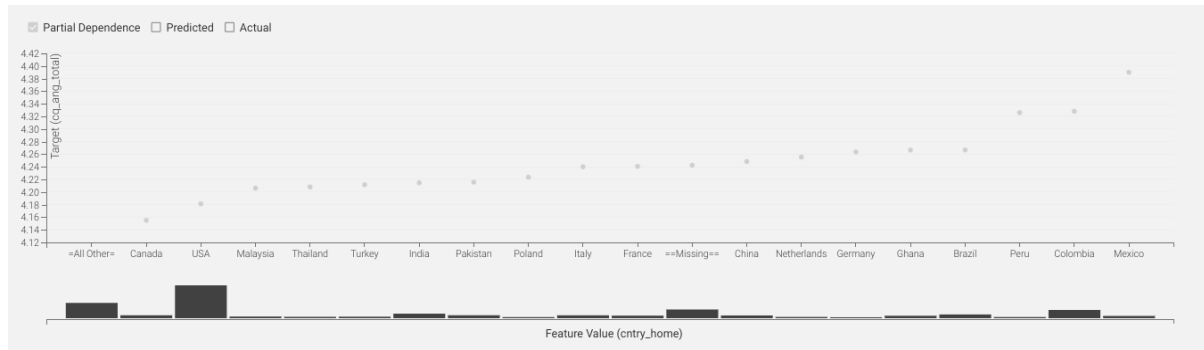
**Figure 35:** Feature effect *Education level*



Mean Predicted	Mean Actual
5,197	5,203
4,130	4,128
4,222	4,231
4,824	4,629
3,793	3,550
5,179	4,960
4,938	4,909

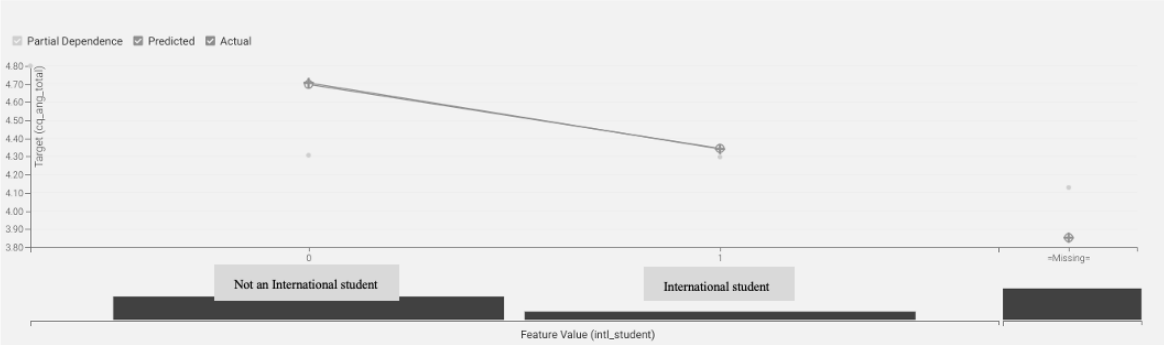
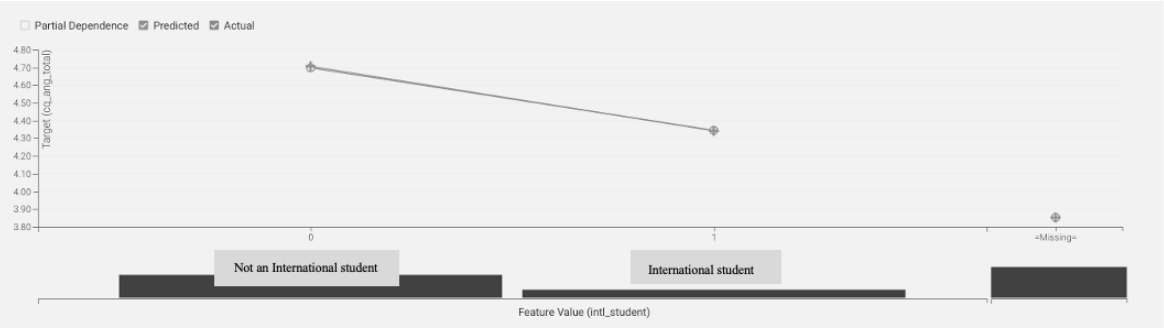
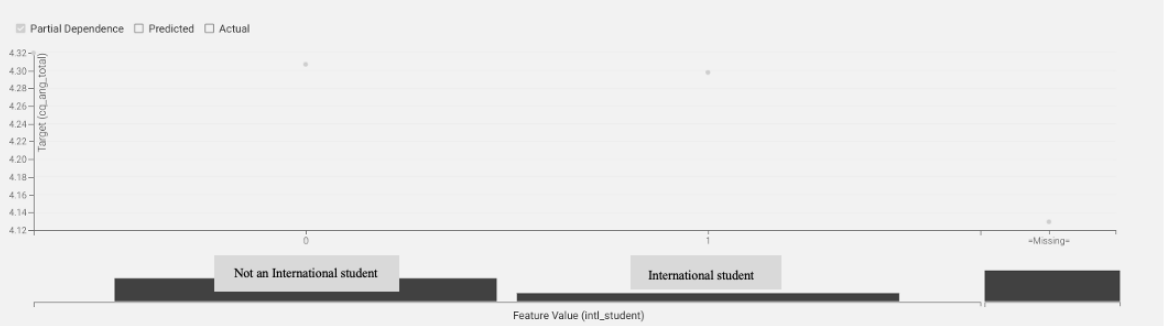


**Figure 36:** Feature effect *Home country*



Country	Mean Predicted	Mean Actual
Missing	4,972	4,936
Brazil	4,496	4,502
Italy	4,379	4,381
Colombia	4,350	4,430
Mexico	4,338	4,430
Polen	4,317	4,181
Other	4,287	4,241
Ghana	4,272	4,294
Tyrkia	4,232	4,149
Malaysia	4,193	4,183
Pakistan	4,179	4,197
China	4,170	4,156
Netherlands	4,159	4,212
India	4,091	4,110
USA	4,045	4,044
Canada	4,010	4,051
Germany	4,000	4,044
Peru	3,955	4,080
France	3,917	3,837
Thailand	3,813	3,715

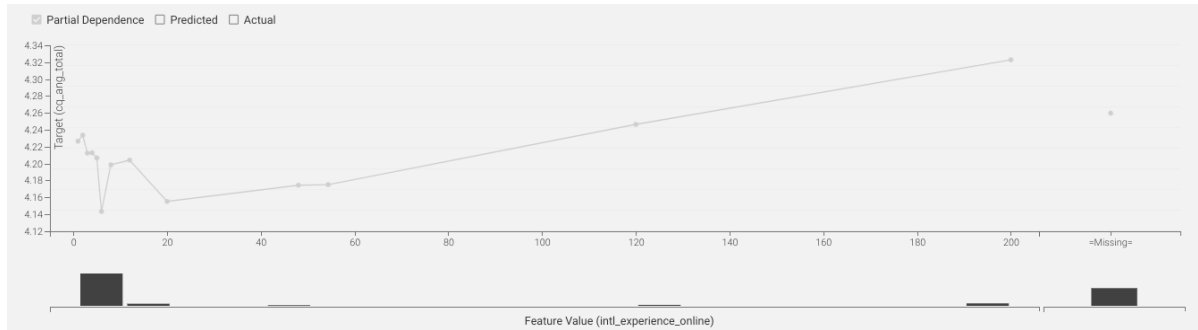
Figure 37: Feature effect *International student*



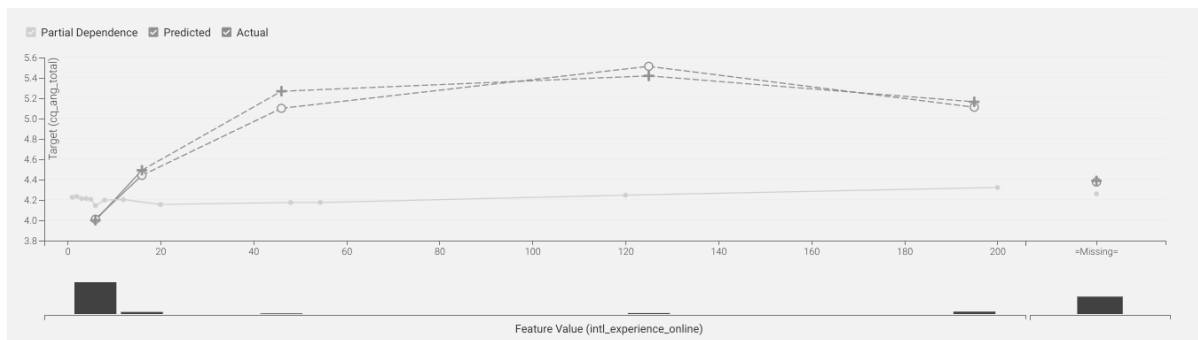
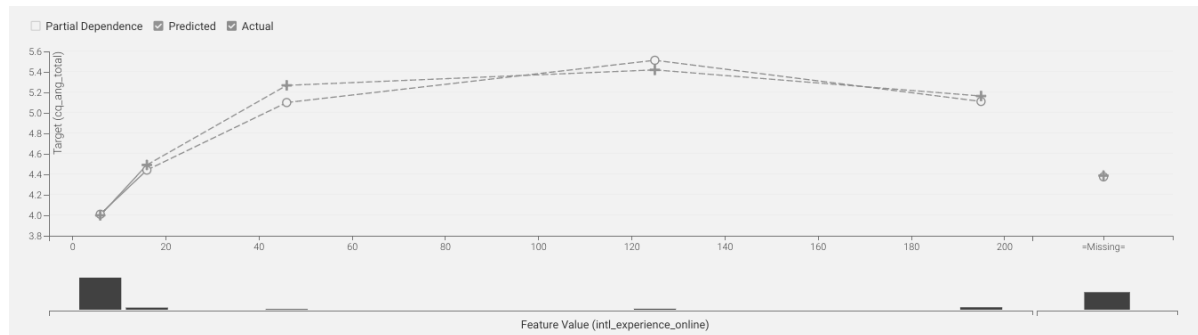
Mean Predicted	Mean Actual
4,71	4,70
4,34	4,34
3,85	3,85



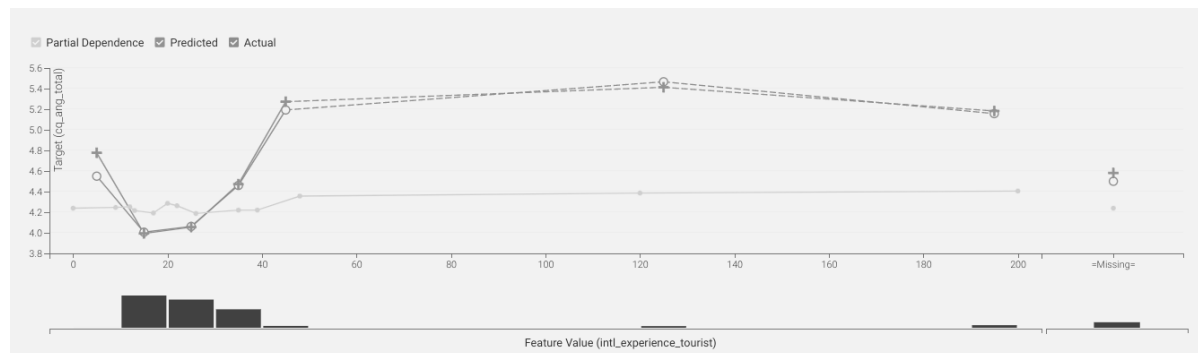
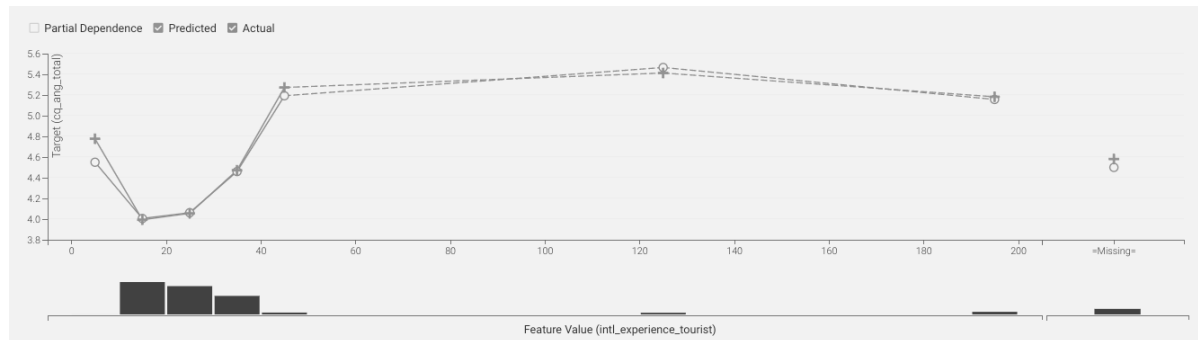
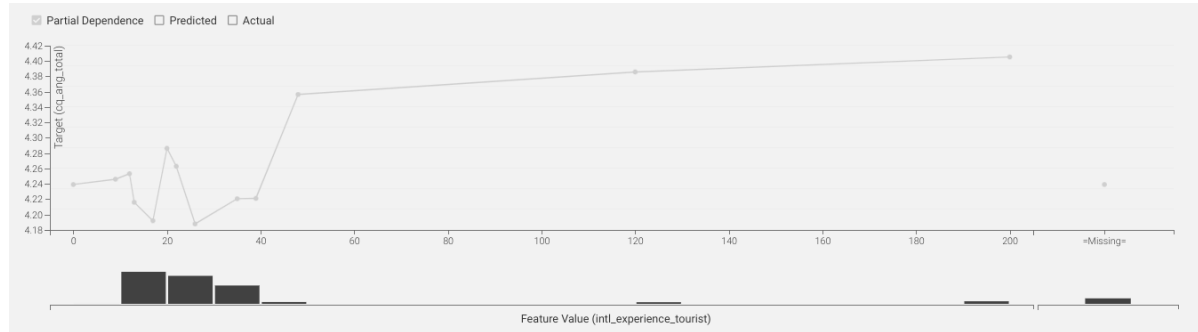
**Figure 38:** Feature effect *Daily interaction with foreigners*



Mean Predicted	Mean Actual
4,000	4,011
4,492	4,442
5,269	5,101
5,420	5,514
5,165	5,112
4,388	4,376



**Figure 39:** Feature effect *Tourism*



**Mean Predicted**

4,777

3,994

4,055

4,472

5,273

5,413

5,183

4,581

**Mean Actual**

4,550

4,006

4,062

4,460

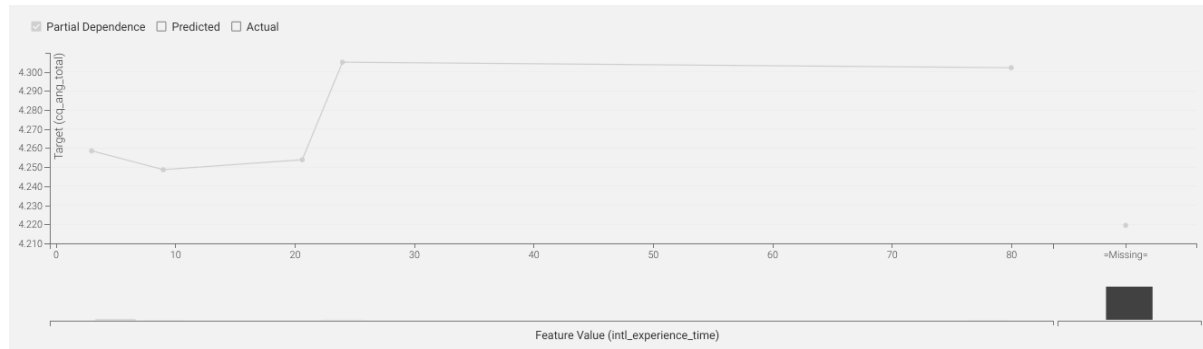
5,193

5,466

5,157

4,500

**Figure 40:** Feature effect *Work abroad*



Mean Predicted	Mean Actual
5,305	5,206
5,129	5,300
5,325	5,619
5,429	5,775
4,222	4,219

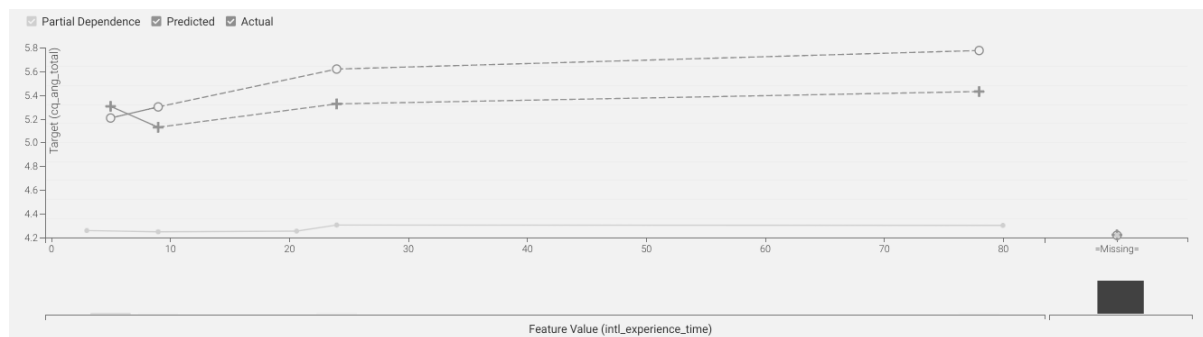
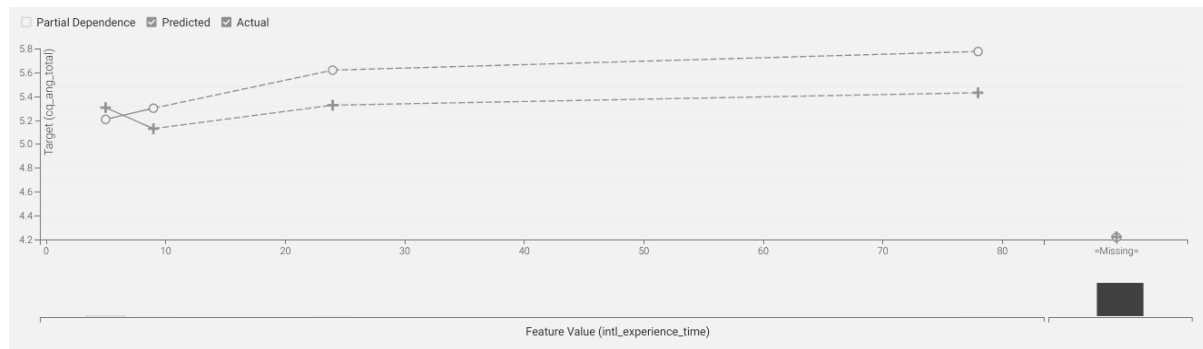
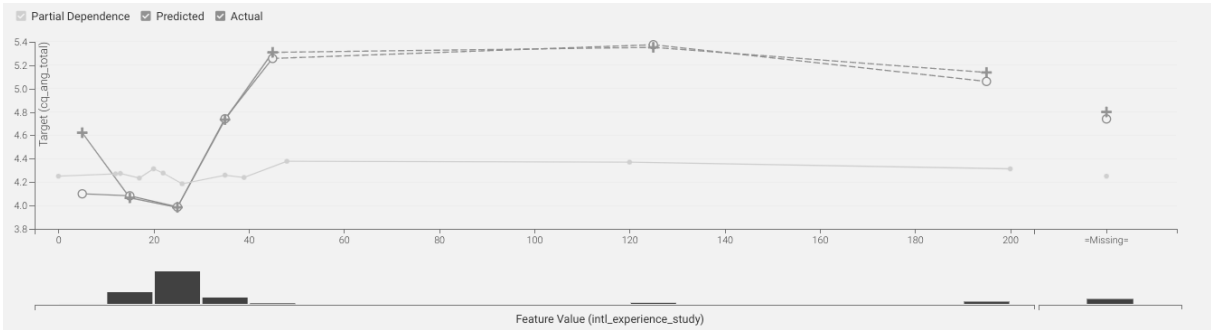
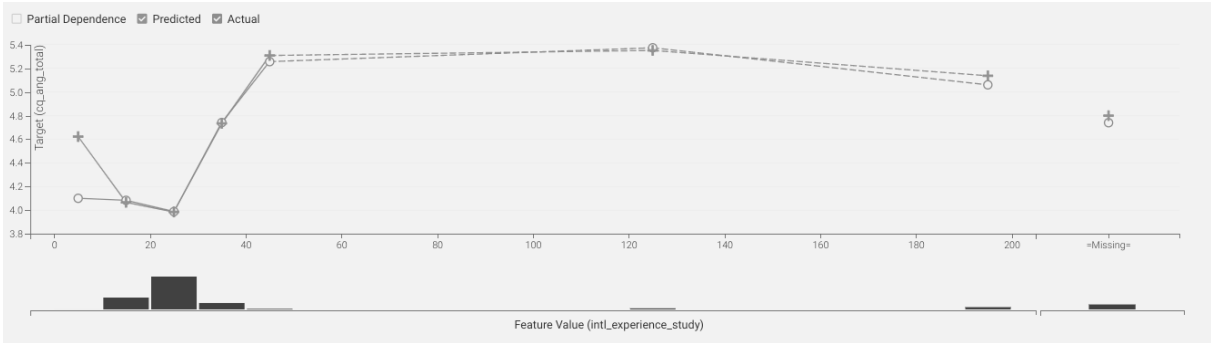
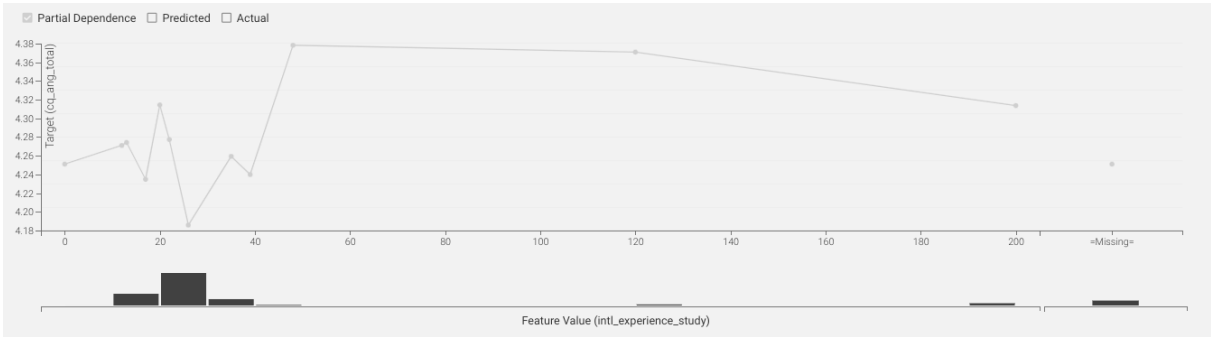
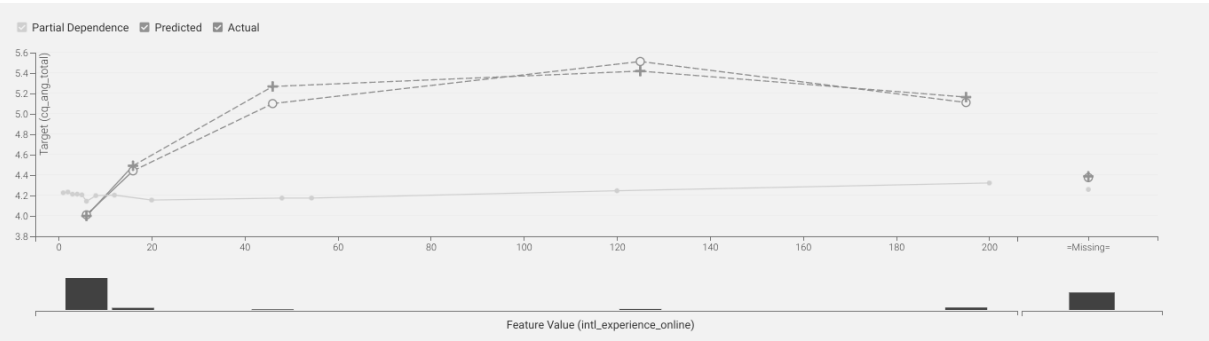
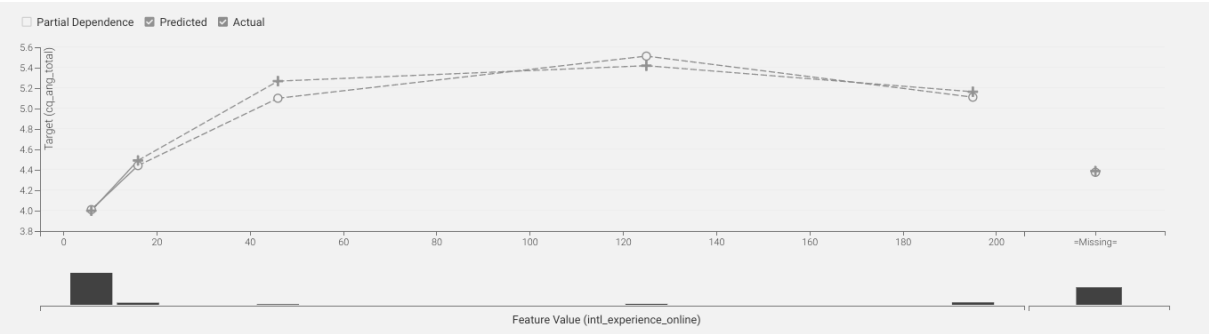
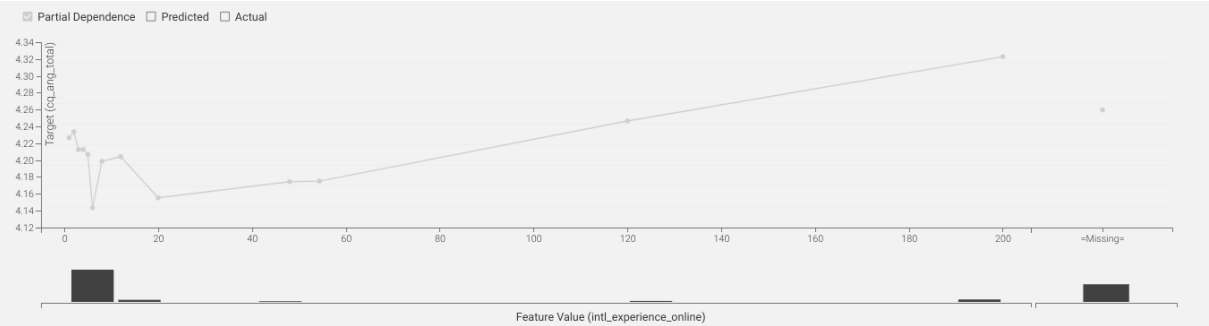


Figure 41: Feature effect *Study abroad*



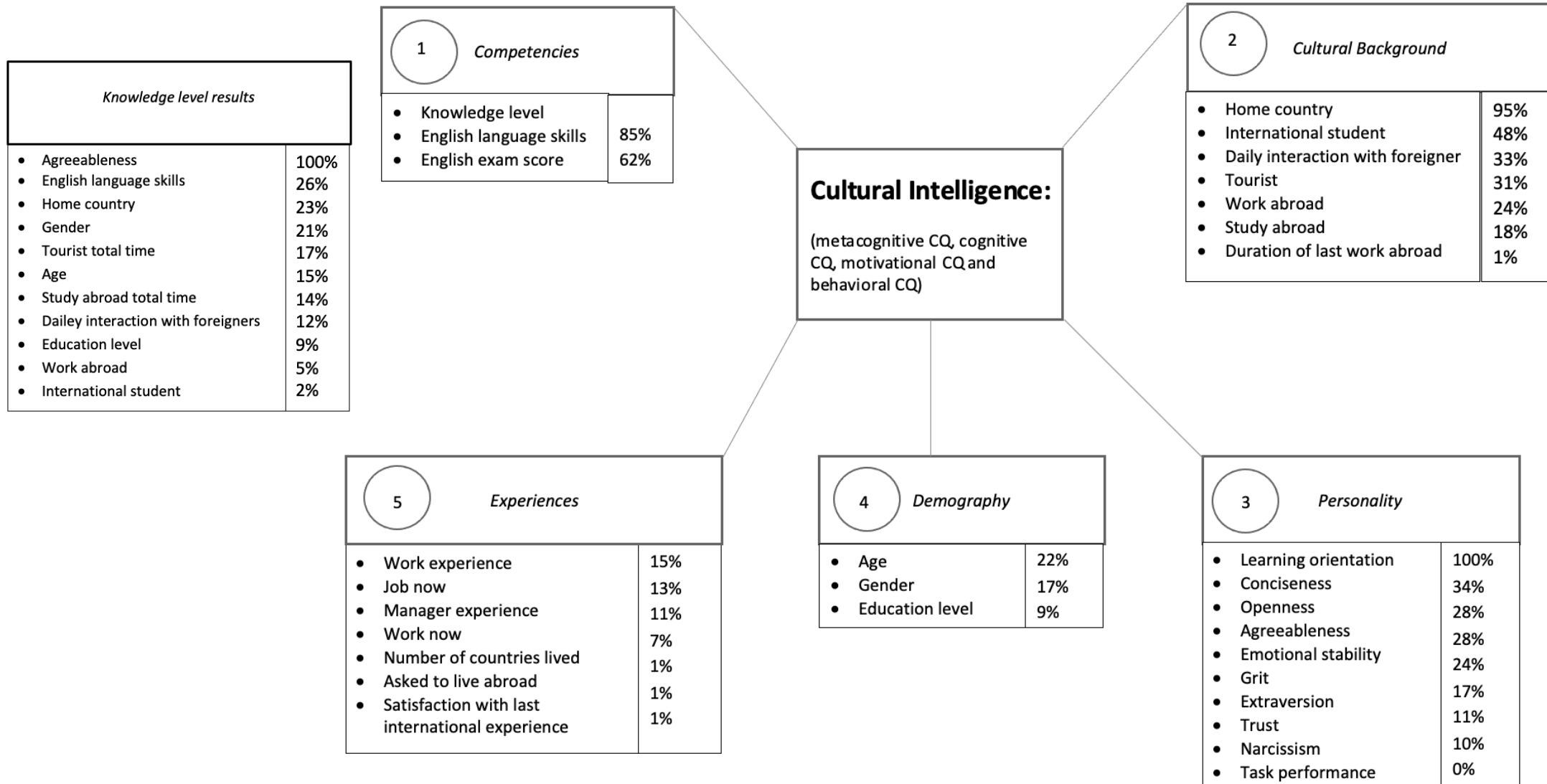
Mean Predicted	Mean Actual
4,623	4,100
4,066	4,083
3,984	3,987
4,735	4,742
5,310	5,258
5,353	5,375
5,138	5,061
4,800	4,741

**Figure 42:** Feature effect *Duration of last work abroad*

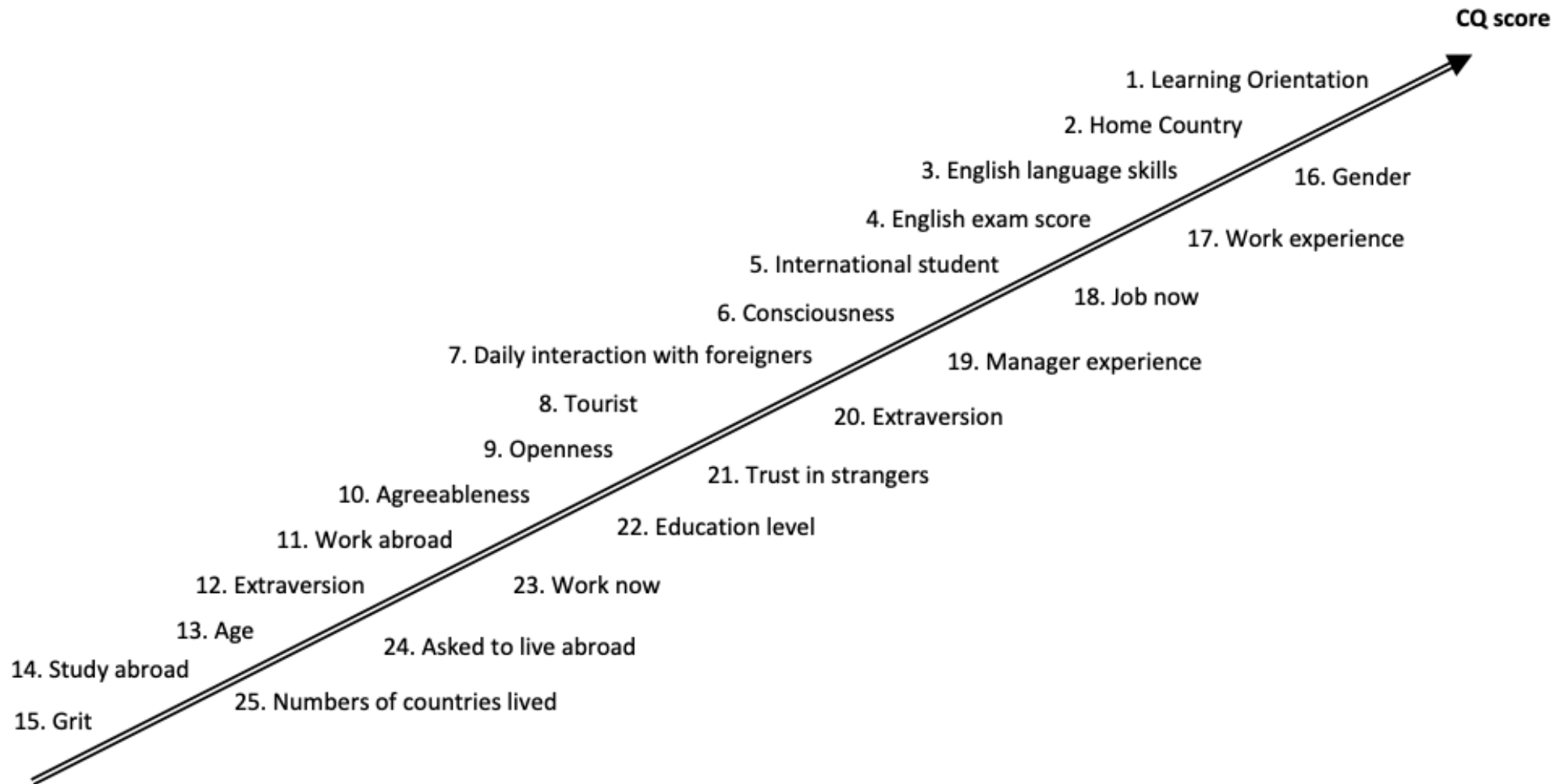


Mean Predicted	Mean Actual
4,777	4,550
4,119	4,112
3,950	3,964
4,749	4,715
5,414	5,225
5,437	5,593
5,127	5,077
4,837	4,800

**Figure 43:** Predictors of CQ ranked by category after importance



**Figure 44:** Features listed by importance to CQ



## *List of Tables*

**Table 1:** Features in the dataset and explanations

Feature Name	Feature description	Feature Type
age	Age	Numerical
gender	Gender	Numerical
level	Level of education	Numerical
work_experience	Work experience	Numerical
manager_experience	Manager experience	Numerical
job_now	Job at this time	Numerical
work_now	Working and studying	Numerical
cq_ang_total	Total score of CQ (Ang et al., 2007)	Numerical
intl_experience_online	Daily interaction with foreigners	Numerical
english_proficiency	English language skills	Numerical
english_exam_score	English exam score	Numerical
grit_total	Grit	Numerical
Narcisim_total	Narcissistic tendencies	Numerical
swift_trust_total	Trust (Propensity to trust strangers)	Numerical
learn_orient_average	Learning orientation	Numerical
bottomline_mentality_total	Task performance	Numerical



cntry_lived_nbr	Number of countries lived	Numerical
intl_experience	Asked to live abroad	Numerical
intl_experience_satisfaction	Satisfaction with last international experience	Numerical
intl_experience_time	Duration of last work abroad	Numerical
cntry_home	Home country	Categorical
intl_student	International student	Numerical
B5_a_average	Agreeableness (Big5)	Numerical
B5_c_average	Conscientiousness (Big5)	Numerical
B5_e_average	Extraversion (Big5)	Numerical
B5_n_average	Emotional stability (Big5)	Numerical
B5_o_average	Openness (Big5)	Numerical
intl_experience_study	Study abroad	Numerical
intl_experience_tourist	Tourism	Numerical
intl_experience_work	Work abroad	Numerical
cq_bciq_know_pct_correct	CQ Knowledge	Numerical

**Table 2:** Descriptive statistics for the overall 31 features

Feature description	Uniq	Missing	Mean	Std.div.	Median	Min	Max
Age	54	771,000	22,920	4,580	22,000	1,000	65
Gender	3	838,000	1,520	0,500	2,000	0,500	2
Level of education	7	1,661	1,270	0,540	1,000	0,000	7
Work experience	8	8,284	3,520	1,740	4,000	1,000	7
Manager experience	6	8,287	1,590	0,940	1,000	0,940	5
Job now	7	8,293	1,970	1,290	1,000	1,000	6
Work now	7	15,375	1,880	1,060	2,000	0,000	5
Total score of CQ (Ang. et al, 2007)	380	0,000	4,230	0,890	4,100	0,880	7
Daily interaction with foreigners	13	5,565	23,070	53,330	6,000	1,000	200
English language skills	40	4,278	8,240	2,190	9,000	1,000	10
English exam score	12	4,431	9,090	1,150	9,000	0,000	10
Grit	43	17,076	3,490	0,420	3,500	0,540	5
Narcissistic tendencies	2	18,372	0,220	0,000	0,220	0,220	0
Trust (Propensity to trust strangers)	18	17,223	3,720	0,710	3,750	0,700	5
Learning orientation	1	2,916	80,890	19,770	86,670	0,000	100
Task performance mentality	2	18,372	1,740	0,000	1,740	1,740	2
Number of countries lived	6	17,989	1,410	0,750	1,000	0,860	5

Asked to live abroad	3	17,223	0,110	0,310	0,000	0,000	1
Satisfaction with last international experience	5	18,178	3,470	0,670	4,000	0,660	4
Duration of last work abroad	5	18,191	6,940	11,270	3,000	3,000	80
Home country	160	1,546					
International student	3	9,402	0,260	0,440	0,000	0,000	1
Agreeableness	230	1,825	4,230	5,460	3,000	0,000	100
Conscientiousness	80	12,644	3,360	0,350	3,380	0,350	5
Extraversion	49	12,643	3,410	0,410	3,380	0,420	5
Emotional stability	54	12,648	3,030	0,430	3,000	0,440	5
Openness	70	12,649	3,620	0,560	3,600	0,560	5
Study abroad	12	1,503	35,190	40,550	26,000	0,000	200
Tourism	12	1,064	33,200	37,270	26,000	0,000	200
Work abroad	12	2,088	37,090	41,150	26,000	0,000	200
CQ Knowledge	235	1261,545	25,793	22,040	15,555	8	80,182

**Table 3:** Feature fit for the chosen model for the feature *Learning orientation*

<b>Mean Predicted</b>	<b>Mean Actual</b>
4,330	4,405
4,399	4,554
4,466	4,407
4,367	4,330
4,536	4,392
4,441	4,401
4,797	4,735
4,239	4,210
3,764	3,697
3,764	3,845
3,780	3,779
3,817	3,778
3,832	3,817
3,854	3,899
3,892	3,915
3,906	3,911
3,930	3,893
3,996	4,034
4,063	4,079
4,182	4,179
5,110	5,091
4,165	4,160

**Table 4:** Correlation table for *CQ Knowledge*

Feature description	Uniq	Missing	Mean	Std.div	Median	Min	Max
Age	38	372	22,89	4,12	22	18	59
Gender	2	632					
Education Level	5	289	1,29	0,49	1	0	4
Daily interaction with foreigners	6	3,138	64,33	73,18	20	2	200
English language skills	21	162	9,34	0,74	9,5	6	10
Home country	115	227					
International student	2	0	0,19	0,4	0	0	1
Agreeableness	9	521	2,99	0,69	3	1	5
Study abroad	6	2,954	65,94	60,92	39	20	200
Tourism	6	1,61	60,86	53,88	39	20	200
Work abroad	6	3,971	53,85	47,28	35	20	200

## Appendix

### Appendix 1: Recently published literature using *X-Culture Data*

Article Name	Source	Purpose	Result
Does National Culture Influence Peer Evaluations on Global Virtual Teams?	Crowne (2020)	Investigate whether culture affects peer evaluation of results on global virtual teams.	Cultural factors had a minor influence on peer evaluation of performance, with English language skill being the most important predictor on performance.
Conceptualizing and measuring cultural intelligence: important unanswered questions.	Taras (2020)	Analyze the shortcomings of current CQ instruments and point out issues that must be discussed to advance our level of CQ understand.	Present a list of questions to be asked before developing a new measure for CQ or before choosing which existing instrument to use to measure CQ.
Diverse effects of diversity: Disaggregating effects of diversity in global virtual teams.	Taras et al. (2019)	Analyze and compare the impact of various types of team member diversity on various facets of global virtual team efficacy in a single study.	Team member diversity has a significant impact on global virtual team effectiveness. Contextual diversity increases task outcomes. Personal diversity is negative to psychological outcomes.
The impact of peer evaluation on team effort, productivity, motivation and performance in global virtual teams.	Tavoletti et al. (2019)	Evaluate the impact of peer evaluations on team effort, effectiveness, motivation, and overall team efficiency.	When peer assessments are used in global virtual teams during the project, teams demonstrate higher levels of team effort; lower levels of average efficiency and motivation; and no consistent signs of increased team performance.
Global virtual team communication, coordination, and performance across three peer feedback strategies.	(McLarnon et al., 2019)	Investigate whether peer feedback, applied in the context of a quasi-experiment, reinforced links between global virtual teams' interaction, collaboration, and efficiency.	When global virtual team members gave and received weekly feedback, the findings showed a stronger indirect impact between communication frequency and achievements through process coordination.

## Appendix 2: Previous research and findings related to the 25 traits measured in this research

Author	Competencies	Cultural Background	Personality	Demography	Experiences
(Alon et al., 2018)	<ul style="list-style-type: none"> <li>Number of languages spoken (+)</li> </ul>	<ul style="list-style-type: none"> <li>Home country (+)</li> </ul>		<ul style="list-style-type: none"> <li>Education level (+)</li> </ul>	<ul style="list-style-type: none"> <li>Number of countries (+)</li> </ul>
(Alon & Higgins, 2005)	<ul style="list-style-type: none"> <li>To be a successful global leader you need high IQ, EQ and CQ</li> </ul>				
(P. Caligiuri & Santo, 2001)	<ul style="list-style-type: none"> <li>Knowledge might be developed through global assignments</li> </ul>				
(Bird et al., 2020)		<ul style="list-style-type: none"> <li>Study abroad (+)</li> <li>Travel (+)</li> <li>Study abroad (+)</li> <li>Service learning (+)</li> <li>Classroom activities (+)</li> </ul>			
(Li, Mobley, & Kelly, 2013)	<ul style="list-style-type: none"> <li>Language abilities (+)</li> </ul>	<ul style="list-style-type: none"> <li>Duration of overseas experience (+)</li> </ul>			
(Koo Moon, Kwon Choi, & Shik Jung, 2012)	<ul style="list-style-type: none"> <li>Language abilities (+)</li> </ul>		<ul style="list-style-type: none"> <li>Goal orientation (+)</li> </ul>	<ul style="list-style-type: none"> <li>Age (+)</li> <li>Education level (-)</li> </ul>	<ul style="list-style-type: none"> <li>Previous international non-work experience (+)</li> </ul>
(Soon Ang et al., 2006)			<ul style="list-style-type: none"> <li>Openness (+)</li> <li>Extraversion (+)</li> <li>Conscientiousness (+)</li> <li>Agreeableness (+)</li> <li>Emotional stability (+)</li> </ul>		
(Li, Mobley, & Kelly, 2016)			<ul style="list-style-type: none"> <li>Agreeableness (+)</li> <li>Openness (+)</li> </ul>		
(Depaula et al., 2016)			<ul style="list-style-type: none"> <li>Openness (+)</li> </ul>		
(Jasenko & Dulcic, 2012)			<ul style="list-style-type: none"> <li>Openness (+)</li> <li>Task performance (+)</li> </ul>		<ul style="list-style-type: none"> <li>Satisfaction (+)</li> </ul>
(Harrison, 2012)	<ul style="list-style-type: none"> <li>Language abilities (+)</li> </ul>	<ul style="list-style-type: none"> <li>International orientation (+)</li> </ul>	<ul style="list-style-type: none"> <li>Openness (+)</li> <li>Agreeableness (+)</li> </ul>		<ul style="list-style-type: none"> <li>Multicultural upbringing (+)</li> </ul>

(Li et al., 2016)		<ul style="list-style-type: none"> <li>• Home country (+)</li> <li>• Length of overseas work (+)</li> </ul>	<ul style="list-style-type: none"> <li>• Extraversion (-)</li> <li>• Conscientiousness (+)</li> <li>• Emotional stability (-)</li> <li>• Openness (+)</li> <li>• Agreeableness (-)</li> </ul>	<ul style="list-style-type: none"> <li>• Age (-)</li> <li>• Gender (-)</li> <li>• Education level (+)</li> </ul>	
(Nel, Nel, De Beer, & Adams, 2015)			<ul style="list-style-type: none"> <li>• Consciousness (+)</li> <li>• Extraversion (+)</li> </ul>		
(A. L. Duckworth et al., 2007)			<ul style="list-style-type: none"> <li>• Grit (+)</li> <li>• IQ (+)</li> <li>• Consciousness (+)</li> </ul>		
(MacNab & Worthley, 2012)			<ul style="list-style-type: none"> <li>• Grit (+)</li> </ul>	<ul style="list-style-type: none"> <li>• Gender (+)</li> </ul>	<ul style="list-style-type: none"> <li>• Manager experience (+)</li> <li>• Work experience (-)</li> </ul>
(Carver & Scheier, 2000)			<ul style="list-style-type: none"> <li>• Grit (+)</li> </ul>		
(A. Duckworth, 2016)			<ul style="list-style-type: none"> <li>• Grit (+)</li> <li>• IQ (+)</li> </ul>		
(Ivcevic & Brackett, 2014)			<ul style="list-style-type: none"> <li>• Courteousness (+)</li> <li>• Grit (-)</li> <li>• Emotional stability (+)</li> </ul>		
(Chua et al., 2012)			<ul style="list-style-type: none"> <li>• Level of trust (+)</li> </ul>		
(Doney, Cannon, & Mullen, 1998)			<ul style="list-style-type: none"> <li>• Level of trust (+)</li> </ul>		
(Li et al., 2013)					<ul style="list-style-type: none"> <li>• Duration of last international experience (+)</li> </ul>
(Gupta, Singh, Jandhyala, & Bhatt, 2013)			<ul style="list-style-type: none"> <li>• Emotional stability (+)</li> </ul>		
(Soga, 2019)			<ul style="list-style-type: none"> <li>• Narcissism (+)</li> <li>• Task performance (+)</li> </ul>		
(Soon Ang et al., 2007)		<ul style="list-style-type: none"> <li>• Cross-cultural experience (+)</li> </ul>	<ul style="list-style-type: none"> <li>• Task performance (+)</li> <li>• Emotional stability (+)</li> <li>• Openness (+)</li> </ul>	<ul style="list-style-type: none"> <li>• Age (-)</li> <li>• Gender (+)</li> </ul>	
(Crowne, 2008)		<ul style="list-style-type: none"> <li>• Work abroad (+)</li> <li>• Study abroad (+)</li> </ul>		<ul style="list-style-type: none"> <li>• Education level (+)</li> </ul>	<ul style="list-style-type: none"> <li>• Job now (+)</li> <li>• Number of countries lived (+)</li> </ul>



(MacNab & Worthley, 2012)		• Tourism (-)			• Manager experience (-)
(Jasenکو & Dulcic, 2012)					• Satisfaction with last intel. exp. (+)
(Schlaegel et al., 2021)		• Grit (+)			
Engle & Crowne, 2014)		• Duration of last intl. exp (+)		• Age (-) • Gender (-)	
(Schwarzenthal, Juang, Schachner, van de Vijver, & Handrick, 2017)		• Country/ cultural background (+) • Intercultural contact (+)		• Age (-)	
(Li et al., 2016)		• Country (+) • Duration of last work abroad		• Age (-) • Gender (-) • Education level (+)	
(Nel et al., 2015)		• Home country (+)			
(Kurpis & Hunter, 2017)		• International student (+)			• Previous international experience (+)
(Kim & Van Dyne, 2012)					• Previous international experience (+)
(Holtbrügge & Engelhard, 2016).		• Grit (+)			

### **Appendix 3:**

## **Discussion Paper – Hilde Malmin**

### **Master's Programme in Business Administration**

#### **Competency goal: INTERNATIONAL**

The concept “International” is a key factor in UiA School of Business and Law’s mission statement and strategy. After completing a Master thesis, it is expected that the student is able to reflect beyond the scope of the thesis. It is therefore asked that the student, alongside with the completed study of research hand in a reflection note discussing the findings and results of the thesis and how it in a broader scope can be related to the concept of “International”. Therefore, in the following text I will provide a summary of my Master thesis followed by a discussion on how my research is related to international trends and forces.

#### **Summary of Master thesis:**

My Master thesis is a research paper focused on the concept referred to as “Cultural Intelligence” (CQ) and contributes to the field of International Management. CQ defines a person’s ability to efficiently adapt and perform in various cross-cultural settings (Soon Ang et al., 2007). Higher CQ can among others lead to higher chances of completing international expatriate assignments successfully, more effective international negotiations, merging efficient and successful teams and produce better quality work. The aim of the research was to identify various traits and personality characteristics that have been connected to CQ in previous research and rank the traits in order after relative importance to CQ. To analyze the results a tool called DataRobot was used. This tool uses machine learning and artificial intelligence to predict accurate models that provides a deeper understanding of each variable included in the analyses. It also provides statistical analyses, relative importance ranking and feature fit to the chosen target variable. The target variable was chosen to be “total CQ score”, which is based on the instrument referred to as “The Four Factor Model” by Soon Ang et al. (2007) and all variables were measured according to this. DataRobot made it possible to keep the full sample size of more than 58 000 replies for analyses. The data used was provided by X-Culture database (X-Culture, n.d.-a), resulting in answers from a broad range of students

from all over the world. The participants attended a virtual team project where individuals from different countries were placed in diverse groups to solve a real-life business problem. Before, during and after the project the students were given survey questions to target various traits related to CQ. Results of the research demonstrate that the most important CQ traits are *Learning orientation*, *Home country* and *Language skills*. All the traits measured were further divided into five categories: Competencies, Cultural Background, Personality, Demography, and Experiences. From this perspective, the traits related to *Competencies* were overall ranked as the most important to predict CQ score. The findings of this research may broaden the understanding of CQ and what elements of CQ should be given more focus moving forward.

### **Cultural Intelligence (CQ) and its relevance in international context**

In this upcoming section, I will reflect on the broader themes of my thesis and identify how my thesis relates to international trends and forces.

#### *CQ as a concept*

CQ can be defined as “a set of cognitive, affective and behavioral skills and characteristics that support effective and appropriate interactions in a variety of cultural contexts” (Bennett, 2008, p. 95). Furthermore, CQ is a “culture-free construct that applies across specific cultural circumstances” (Ng & Earley, 2006, p. 10). In this lays the understanding that CQ is not about the capability to function effectively in one specific culture or society, rather it reflects a person’s ability to effectively and successfully adjust to a variety of different cultural environments (Earley & Ang, 2003). Among others, in international settings, people are different by culture and might see things through different lenses and have different perspectives, norms and values that can affect communication and how points come across. This makes CQ as a concept, as well as knowledge about its effects and outcomes highly relevant for any settings involving people, and especially significant in international relations.

#### *General importance of CQ*

In general, a business consisting of a diverse team of individuals with high CQ is beneficial for both international as well as domestic firms. Especially when managing a culturally diverse value chain or working with products or processes that require good adaptation skills or the ability to gain local knowledge in an efficient manner. It can also make the internationalization process more efficient and manageable. It is stated that even though “...some workers may never work outside their country of citizenship, many will interact with

customers, clients, suppliers, and co-workers who are themselves outside their home country” (Crowne, 2008, p. 396), indicating that CQ is important in a broad variety of settings.

Research and interest on CQ have increased the last years with globalization leading to Multinational corporations (MNCs), organizations and global institutions doing trade or frequently engaging in cross-cultural contexts. Due to variations in price difference and income between home market and other global markets, establishing business abroad is increasing, and with this comes the need to understand how to establish trustworthy and efficient operations for expatriate’s workers and managers. Research have demonstrated how CQ is an important construct of intelligence on both national and global levels. With a deeper understanding of the traits and characteristics that influence CQ, challenges related to cross-cultural interactions and increased globalization, like culture shock, individual culture bias, expatriate exploitation, expatriate experiences, costs related to assignment abroad and communication between culturally different actors can improve. The construct has through previous empirical research been suggested to explain and predict attitudes and performance, organizational behaviors and expatriation intern, (Richter et al., 2020) as well as cross-cultural adjustment (Huff et al., 2014) cultural effectiveness, work satisfaction, negotiation performance (Lee et al., 2014) or job performance (Soon Ang et al., 2007), making this research really relevant for the overall topic of “international”.

### *CQ and employment settings*

Businesses wish to employ people that have a diverse set of skills and characterizes that can benefit the business on many levels. Therefore, it is valuable to have knowledge about what traits that based on research show to be predictors of high CQ, to evaluate who might be the most suitable candidate to meet the job requirements and perform successfully. Today, when recruiting people for jobs or other assignments, much focus is directed at the individual’s experiences, like leadership experience or current job position. For various reasons, focusing on finding candidates with the “correct” experiences is believed to be a good way to ensure that the candidate possesses the desired qualities to handle the job in a good manner. This research challenges this view, as the results demonstrates that an individual’s experiences are not the most significant to CQ score, nevertheless it is the least important. This indicates that focusing on experiences will not necessarily be a good way to find the best suitable person for a job or when trying to address who has the better overall CQ score. The findings instead demonstrate that focus should be directed to the individual’s Competencies (e.g., Knowledge level and language skills). Then, attention to Cultural background (e.g., previous experiences

in intercultural settings, home country and travel experience) should be granted, followed by Personality traits (e.g., learning orientation – especially focus on agreeableness and conciseness) and at last attention should be directed to Demographics (e.g., age, gender, education level) and Experiences (e.g., work experiences, manager experience, and current work situation). Also, considering each trait separately, traits like *Learning Orientation* and *Language skills* and *Knowledge level* seems to be of high importance to determine a person's CQ level.

Knowing this, recruitment companies can benefit and better candidates for various jobs might be selected. Instead of using a variety of personality tests and other measurements to measure personal fit to the organization, the results of this research demonstrate that using other measurements like BCIQ test (Alon et al., 2016), that focuses highly on measuring knowledge level and CQ for business related settings, might be a better tool to use since knowledge level is seen to have such high influence on CQ. Using this tool might provide better and more useful results for the organization in search for the most suitable person for the job. Especially considering if the person will work in an international and cross-culture environment, a broad set of qualities and skills are needed and beneficial to heighten the chances of success for the company.

### *CQ and adjustment*

In the light of the ability to adjust, there have been several studies questioning if people with high intelligence quotient (IQ) adjust better than others to new cultural settings. By contrast, in international contexts, motivational cultural intelligence is the most consistent indicator of affective outcomes. Until today, cultural adjustment in temporary and foreign settings has shown to be the most studied affective outcome of cultural intelligence. Examples of adjustment can be general adjustment (i.e., how you in a foreign culture generally adapt to local living conditions) and work adjustment (i.e., how well you adjust to work in a new culture) (Leung et al., 2014). Many studies have looked into these outcomes of cultural adjustment, and in general findings repeatedly show that high cultural intelligence will influence the level of adjustment to a high degree.

### *CQ and global virtual teams*

To continue, working in global virtual teams are becoming more and more common in today's business world. Global virtual teams are defined as “temporary, culturally diverse, geographically dispersed, electronically communicating work group[s]” (Jarvenpaa & Leidner,

1999, p. 792). Unique challenges can arise due to the virtual nature of the team, as well as challenges related to cultural differences. In the research field, there is an increased interest in trying to determine if there is a positive or negative link between cultural diversity and performance in global virtual teams. Today there is a lack of research on this, but several sources in literature suggest CQ may be a variable that can help explain team performance on global virtual teams (Richter et al., 2021), which can be of high relevance for success and efficient communication in international settings. Especially after the Covid-19 pandemic, the world has had to adapt to new ways of doing business and communicating, and we see that using online platforms to collaborate is a possible way to share information and conduct business from afar without the need for physical presence. To be an efficient communicator and get important points across while not meeting face-to-face can be a challenge on its own, and therefore the need for candidates that are good adapters and can take on a challenge in a good way is of high request.

### *CQ and society*

Furthermore, in media today we see increased public debates discussing “immigrant crises”, “increasing anti-immigrant sentiments” and cases on how to handle the increased immigration, to mention some. In addition, people migrate more than ever seeking opportunities and experiences, and move for job- or study opportunities outside their home country. Societies in general are becoming more diverse, and people are faced with settings favoring high cultural awareness to avoid misunderstandings, miscommunication and unfair judgments based on wrongly directed assumptions because of the lack of knowledge and cultural understanding. These examples highlight the need for sensitivity and more focus directed at cultural awareness (Taras, 2020). Thus, the world is getting smaller and the need for good adaptation and effective communication across cultures and countries are increasing every day.

### *Summary*

In summary, awareness of CQ and how it can influence a person, its performance and adjustment in various settings are of high importance in this increasing global world where cross-country collaboration is increasing, we travel more, people change country for employment or study reasons, conducting international business is increasing, and the world is becoming “smaller” as we speak. We are one world, and its people have different experiences,

cultures, values, personal characteristics, and reference points. This beautiful diverse world has high potential of inclusiveness, understanding and tolerance, as well as high success factors in doing business across countries, and other international collaboration settings, if we only learn how to utilize its potentials and resources. A deeper understanding of the construct of CQ can help broaden this understanding. My research on CQ and its many traits can help direct attention to the attributes that are favorable for cultural development and understanding and help direct focus to the most important traits. Some characteristics are easier to change than others, and some are just embedded in our personality, but nevertheless one should always seek for potential developments and improvements. Therefore, if a manager or culturally different colleague can help you broaden your horizon to see the world with wider lenses, then a more united international world might be the outcome, and more success for everyone in a variety of settings can occur.

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