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The Effects of Extraversion on Recruitment Process Preferences as Declared by  
Respondents

tytuł w języku polskim: Poziom ekstrawersji w pięcioczynnikowym modelu osobowości i jego wpływ na preferencje kandydatów co do formuły procesu rekrutacji

słowa kluczowe: Extraversion, Openness, Recruitment Process, Big Five Personality Traits, Best-worst scaling, MaxDiff, Big Five Inventory, R, SPSS

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### **Abstract**

An employee's future performance at work is essential to the recruitment process. Failed recruitment leads to lost time and effort and employee turnover. Studies show that people who are extraverts and people who are open to new experiences perform better at work. The question is whether people with these types of personalities have specific requirements for the recruitment process. This study, conducted with rigorous scientific methods, was designed to find the answer to this question. Seventy-six respondents (65.8% Male, 30.3% Female, 3.9% Prefer not to say) were asked about their recruitment preferences and to fill out a Big Five Inventory questionnaire. Based on the responses, it was found that there are preferred means of recruitment when it comes to extravert aspects of a personality. People open to a new experience do not have clear preferences towards recruitment processes. It was also found that there is a clear set of preferred recruitment processes, while some are disregarded, regardless of personality type. The findings of this study, backed by robust data analysis, might be particularly interesting for HR departments and people actively participating in recruitment processes.

*Keywords:* recruitment processes, personality traits, extraversion, openness to new experiences, Big Five Inventory, SPSS, R, MaxDiff, best-worst scaling, bwsTools, questionnaire, data analysis.

### Streszczenie

Możliwość oszacowania przyszłej wydajności pracowników jest niezwykle istotna w ramach procesu rekrutacji. Nieudane rekrutacje powodują straty czasu, zasobów, a docelowo prowadzą do rotacji pracowników. Badania pokazują, że osoby ekstrawertyczne oraz otwarte na nowe doświadczenia osiągają lepsze wyniki w pracy. Pytanie brzmi: czy osoby ekstrawertyczne oraz osoby otwarte na nowe doświadczenia mają określone preferencje co do rodzaju procesu rekrutacji? Niniejsze badanie, przeprowadzone z zachowaniem najwyższych standardów badawczych, miało na celu znalezienie odpowiedzi na to pytanie.

Siedemdziesięciu sześciu respondentów (65,8% mężczyzn, 30,3% kobiet, 3,9% nie zadeklarowało swojej płci) zostało zapytanych o ich preferencje rekrutacyjne oraz o wypełnienie kwestionariusza Big Five Inventory. Na podstawie odpowiedzi stwierdzono, że w przypadku ekstrawersji da się zaobserwować istotne statystycznie preferencje dotyczące określonych metod rekrutacji: ustrukturyzowanej rozmowy kwalifikacyjnej oraz omówienia prywatnie realizowanych projektów na platformie GitHub. Co do osób otwartych na nowe doświadczenia, wyniki nie są konkluzywne. Zauważono również, że istnieje wyraźny zestaw preferowanych procesów rekrutacyjnych, oraz zestaw niepożądanych procesów rekrutacyjnych, niezależnie od typu osobowości. Wyniki tego badania, poparte rzetelną analizą danych, mogą być szczególnie interesujące dla działów HR oraz osób aktywnie uczestniczących w procesach rekrutacyjnych.

*Słowa kluczowe:* procesy rekrutacyjne, rekrutacja, cechy osobowości, ekstrawersja, otwartość na nowe doświadczenia, Big Five Inventory, wielka piątka, SPSS, R, MaxDiff, best-worst scaling, bwsTools, kwestionariusze, analiza danych.

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## Introduction

Every sufficiently sizable organization requires employees who can fulfill its strategic goals. Organizations have to resort to recruitment processes to acquire the best possible employees. This goal is typically achieved throughout various hiring processes. In the case of small businesses, these processes can be maintained by the business owner or a low-level manager. Corporations delegate this activity to dedicated departments (e.g., Human Resources) or external agencies (Filipowicz, 2019). No matter who is responsible for the process and its shape, there are always two sides: the candidate and the recruiter. Recruiters are typically equipped with well-defined recruitment procedures developed by people from the organization or external entities. The other side of the coin is a candidate. These people, on top of their professional experience, represent a variety of personalities and possess various personality traits. The research presented in this thesis tries to determine whether every hiring process is a good fit for these potential employees. Is every hiring process well suited for people with various personality profiles?

In the following sections, we will describe personality traits as they are defined in this work. Then, we will describe recruitment processes and various ways of determining whether people are a good fit for the company. We will talk about different means of measuring Big Five Traits and how levels of the traits were acquired in the thesis. In further sections, we will talk about MaxDiff analysis and how it was applied to measuring people's preferences regarding the recruitment process. Eventually, I will move on to a discussion of results and conclusions. The last section of the thesis will discuss possible future work based on the results.

The final answer of this thesis settles whether there is a correlation between personal traits and recruitment process preferences.

### **Importance of the Recruitment Process**

The recruitment process can have positive or negative outcomes. Hiring the wrong person for a task can increase turnover within a company's staff. Turnover may have a harmful impact on the company itself. It leads to costs for the company in terms of lower revenues and profitability. It impacts employees with heavier workloads, lower productivity, and reduced employee morale (Bussin, 2018). It is possible to reduce turnover levels by applying employee retention. It has a direct impact on turnover rates - it lowers them. Retention is typically applied to people of great value to the company. Companies usually do not fight to keep employees within their structures when people are non-efficient, unqualified, and unwilling to adapt. Sometimes, companies are simply required to adjust their processes to overcome issues with recruitment difficulties. For example, how a particular task is carried out has to change; the company must introduce new benefits or provide extra training to keep people efficient (Philips, 2006). However, these activities occur once a problem is already spotted. The question here is - can we somehow reduce the number of issues by improving recruitment processes? Should we develop personality-oriented cases? Does it even make sense to try this kind of approach?

### **Personality Models**

Personality concepts can be approached from various perspectives: psychodynamic, humanistic, behavioral, and trait-based. Every theory focuses on a different idea of personality. Psychodynamic theory, developed by S. Freud, claims that personality arises from the interplay of various unconscious forces, namely: Id - operating on the pleasure principle, seeking immediate gratification, Ego - operating on the reality principle, mediating between the demands of the id, superego, and the external world, Superego - representing the internalized moral standards and values, learned from parents and society. Freud's theory of

personality highlights the role of unconscious conflicts, instincts, and early childhood experiences in shaping personality development (Freud, 1927).

A. Maslow proposed a different perspective in his theory of the Hierarchy of Needs. He suggested that human motivation is driven by the hierarchical structure of various needs: physiological, safety, belongingness, esteem, and self-actualization. Maslow's theory suggests that individuals move through these needs sequentially, starting with physiological needs and progressing upward. However, it is important to note that this progression is not always linear, and individuals may move back and forth between different levels depending on their circumstances (Maslow, 1943).

A behavioral approach to personality focuses on observable behaviors. B. F. Skinner was one of the proponents of this approach. With his radical approach, he suggested that behaviors are shaped and maintained by reinforcement and punishment. According to Skinner, behavior is shaped through a process of reinforcement, where behaviors that are positively reinforced are more likely to be repeated. In contrast, those behaviors that are punished or not reinforced are less likely to occur. Central to Skinner's theory is the concept of operants, which are behaviors that operate on the environment, producing consequences.

The trait-based approach to personality focuses on identifying and categorizing consistent patterns of behavior, thoughts, and emotions that differentiate one individual from another. Traits are stable, enduring characteristics that describe an individual's typical behavior across various situations. G. Allport, R. Cattell, and H. Eysenck made the groundwork of personality theory based on traits. Each developed a slightly different set of personality traits (Allport, 1937; Cattell & Mead, 2008; Eysenck, 2013). Nevertheless, measuring certain traits in these theories is crucial. The measurement is typically done using self-reported questionnaires. These theories also assume that traits remain consistent over time. The trait-based approach provides a valuable framework for understanding and

describing individual personality differences, focusing on identifying and measuring stable and enduring traits (Cervone & Pervin, 2011).

This work will focus on a trait-based approach to measuring personality (Costa & McCrae, 2008). The following section summarizes the evolution of the trait-based personality model throughout history.

### **Big Five Personality Traits**

The evolution of understanding personal traits lasted a few decades. R. Cattell pioneered the work to determine factors that define a person's personality. H. Eysenck later extended these works. Finally, research led to the development of modern psychometric instruments - like the NEO-PI-R - developed by P. Costa and R. McCrae. Cattell's Sixteen Personality Factors (16PF) model (Cattell & Mead, 2008), created in the mid-20th century, identified key dimensions of personality through factor analysis. This model contained (among the others) factors such as extraversion, emotional stability, and openness to experience. Eysenck furthered this research with his theory, focusing on two primary dimensions: extraversion-introversion and neuroticism-emotional stability (Eysenck, 1998). His work led to extracting psychoticism as well (as a part of personality). These early models laid the groundwork for more comprehensive assessments. Then came the NEO-PI-R, based on the Five Factor Model (FFM), also known as the Big Five personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism. These traits represent broad personality domains, providing a more nuanced understanding of individual differences and offering valuable insights into behavior, cognition, and emotional patterns. The development of the NEO-PI-R (Costa & McCrae, 2008) solidified the Big Five as a widely accepted framework for personality assessment (Cervone & Pervin, 2011). These tools are a de facto standard tool for studying human personality. These tools are often used together with



different means of measuring human behavior to find correlations between Big Five personality traits and preferences of study participants.

In this paper, the Big Five Inventory (John, 2007), a tool designed to measure personality traits, was used to determine whether preferences towards particular recruitment processes depend on personality type. The arguments for choosing this specific tool are discussed later in the following sections (see *Means of Measuring the Traits*).

### **Impact of Big Five Personality Traits on Employer's Performance**

According to recent studies extraversion has an impact on motivational advantage - “(...) extraversion's motivational advantage derives from enhanced sensitivities for and drives to approach desired rewards in the workplace; it also functions to activate the behaviors necessary to accomplish these positive approach goals” (Wilmot et al., 2019, p. 1460), emotional advantage - “(...) extraversion's emotional advantage is the result of beneficial effects stemming from more frequent experiences of higher levels of positive emotion” (Wilmot et al., 2019, p. 1460), interpersonal advantage - “Extraversion's interpersonal advantage, in sum, represents greater skill in interacting with and leading others” (Wilmot et al., 2019, p. 1460) and performance advantage - “(...) extraversion's performance advantage derives from its capacity to facilitate higher performance on the job, more proactive behaviors, and contribute to a higher probability of success in receiving desired rewards in the workplace” (Wilmot et al., 2019, p. 1460). Assuming that extraversion proves to be beneficial for overall performance, it is interesting to study whether there are clear indications that extraverted people value some of the recruitment processes over others. Knowing that would allow us to shape the recruitment process in a way that naturally promotes extraverted people.

Another personal trait that influences people's performance is openness. A recent study shows that people open to new experiences are more likely to achieve higher results and perform better (Gatzka, 2021). The author has noticed that openness correlates positively with

GPA and subjective achievement, and persistence correlates with GPA and subjective achievement.

We must remember that performance and efficiency are not the only factors affecting the work of teams solving a common goal. Teams consisting of individuals are a place where various conflicts emerge. A. P. Monterio (2016) analyzed various research studies on this aspect. As she mentions, we can note the advantage of extravert and open people in the way they approach conflicts and their resolution:

The results show that individuals with high scores on extraversion and openness to experience prefer to use compromise instead of avoidance in conflict management. Thus, the authors infer that students maintain positive relationships with others and try to use win-lose or win-win strategies (Monteiro et al., 2016, p. 34).

These findings show that extraverted and open people reduce avoidance while solving issues. They act proactively. This aspect of performing at work - being proactive - was also measured in a study where 305 software engineers were asked to fill two questionnaires: a 10-item brief form (to measure respondents' proactivity as seen by participants) and Big Five factors were measured using Saucier's Mini-Markers - 40-item questionnaire (Rodrigues & Rebelo, 2013). The authors presented these results (six months after the study) with the results of the periodic assessment. Results of the study "indicated that openness ( $\rho = .38$ ), extraversion ( $\rho = .33$ ), and conscientiousness ( $\rho = .14$ ) contribute significantly to the explanation of variance in proactive personality" (Rodrigues & Rebelo, 2013, p. 25).

The quoted research shows that extraversion and openness positively impact people's performance. It is worth looking for extraverted candidates and people open to new experiences. Doing so, however, is more complicated. It is hardly possible to incorporate trait measurement into the recruitment process. It would imply running these processes by qualified personnel (people with a psychological background and qualifications required to

conduct psychometric tests) and would risk making the process unfair. It is not allowed to force people to participate in psychometric tests during the recruitment process (unless the profession requires these checks - e.g., military, police). Psychometric data is not a type of information that the employer might request<sup>1</sup>. Candidates can voluntarily agree to participate in the test procedure; however, this cannot be enforced. This means that the recruitment process might be unfair to some candidates. However, suppose it turns out that there are significant differences in terms of recruitment preferences depending on the personality traits. In that case, it means we can shape the recruitment process so that it naturally promotes certain personality types. This would increase the chance of finding the right person for a job. Thus, the question is: Do recruitment process-related preferences depend on personality traits?

### **Scientific Problem**

No direct indication exists of how preferences towards different recruitment processes depend on personality profile. We suggest, rather than formulating a specific, direct hypothesis, aim to address scientific questions. We seek to investigate whether there are significantly different preferences towards preferred recruitment processes. We will focus our analysis on two specific factors, extraversion and openness to experience, chosen from a complete set of factors constituting the Big Five personality traits. While acknowledging the presence of other factors, this study will concentrate on these two variables due to their relevance and significance in addressing the research question. We will compare choices made by extraverted and introverted people. We will also compare choices made by open and closed people. Based on what we have written in the previous section, we suggest investigating the following two scientific questions:

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<sup>1</sup> Dz. U. 1974 Nr 24 poz. 141, art. 22(1) § 1 i 2 Kodeks pracy

- Do extraverts and introverts have different preferences towards particular recruitment processes?
- Do open and closed people have different preferences towards particular recruitment processes?

Suppose there are differences in recruitment preferences. Suppose we are also interested in recruiting an extravert for a salesperson position, while an introvert might be more suitable in the accounting department. In that case, we can shape the recruitment process so that it naturally promotes people with specific personality profiles, depending on workplace requirements. However, suppose there are no preferences regarding recruitment processes based on personality traits. In that case, it might be challenging to adapt the recruitment processes to our preferred choice of the personality type required for the job.

## **The Method**

### **Procedure**

We have conducted the study using a custom, self-designed questionnaire. We recruited participants via various Internet channels and asked them to fill out three sections of the questionnaire: demographics, Big Five Inventory (46-item long), and MaxDiff questionnaire (15-item long). The entire questionnaire content is part of this work - Appendixes A through D. We have given every participant a unique ID (we have not collected personal data during the study). Once the research is concluded, participants can retrieve their results via a dedicated web form. We have analyzed data using SPSS (Version 29.0.0.0), RStudio (Version 2023.12.1+402), and R (Version 4.3.2). MaxDiff results were calculated using bwsTools (Version 1.2.0). The source code used during the analysis is available in the GitHub repository: <https://github.com/mkowsiak/big5hr>.

The following sections focus on each aspect of the study. We discuss the overall questionnaire design, the Big Five Inventory to measure personal traits, the best-worst calling method to measure recruitment process preferences, and the MaxDiff questionnaire design.

### **Questionnaire design**

Due to the nature of the study, we used CAWI (Computer-assisted web interviewing) to get the participants' self-descriptions. CAWI is also referred to as the Web Survey. We have distributed the questionnaires via various communication channels. It was distributed within two IT departments of two commercial companies - using e-mail communication and internal subscription lists. In addition to that, we have distributed it through a dedicated web page accompanying the master thesis<sup>2</sup>, IT-related news portals 4programmers<sup>3</sup>, and Hacker News<sup>4</sup>. We have advertised it via the X<sup>5</sup> platform (formerly Twitter) channel belonging to the author and through the LinkedIn<sup>6</sup> portal (mainly through comments in LinkedIn posts related to HR matters). Overall, we have prepared and sent 13 separate links to the survey to participants. We have decided to diversify the possible sources of study participants to ensure responses are received.

Web surveys are self-administered and provide no personal contact between the interviewer and the respondent. The design of the study should be self-explanatory. Instructions should be as precise and detailed as possible - there is no way for respondents to ask for clarification of questions or the content of the survey. It was made sure that surveys communicated what was expected from respondents. A trial and error round was performed before the actual study started. Remarks and suggestions were collected and applied to the survey.

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<sup>2</sup> <https://big5hr.org/>

<sup>3</sup> <https://4programmers.net/>

<sup>4</sup> <https://news.ycombinator.com>

<sup>5</sup> <https://www.x.com>

<sup>6</sup> <https://www.linkedin.com>

CAWI surveys lack the ability to track respondents' body language. This means studies focusing on a person's behavior should be conducted differently. In the case of this particular study, this was not an issue. Due to basing mostly on a self-description of respondents, observing and noting their reactions was not required. Coverage error was reduced to a minimum by the highly selective choice of companies participating in the study and choosing dedicated internet forums and groups purely focused on IT-related aspects. One of the benefits of CAWI is the cost per person. These surveys do not require the materials or the assistance of interviewers. On this ground, it was decided to design, distribute, and analyze data using a CAWI-based approach (Cowles & Nelson, 2015).

We have prepared and distributed surveys using the *qualtrics XM<sup>7</sup>* platform, a set of tools that allows the design, distribution, and analysis of statistical study results. We prepared the study with complete anonymity as one of its factors. It was one of the key factors considered during the questionnaire design phase. No personal information was collected to make respondents feel comfortable and ensure their highest level of sincerity. We discuss this and other aspects of survey design in the following sections.

In total, people invited to fill out the survey opened 96 questionnaires. Participants have filled out 76 surveys. It is hard to say the cause of not starting or not finishing the questionnaire. Some participants decided to drop surveys either at the beginning or in the middle of the data collection process. One of the limitations might have been the language barrier. We have prepared questionnaires in English. It might have happened that people who do not speak English quit the questionnaire after seeing the first page. Also, so-called bots/robots browse the internet for indexing purposes, and in such a case, questionnaires might have been opened but never filled out.

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<sup>7</sup> <https://www.qualtrics.com>

The questionnaires presented to the participants were precisely the same for every participant. Each questionnaire was composed of four parts: introduction and consent (Appendix A), demographics section (Appendix B), Big Five Inventory (Appendix C), and questions prepared for MaxDiff analysis (Appendix D). We describe each part of the questionnaire in the following thesis sections.

### **Means of Measuring the Traits**

There are different means of measuring BIG-5 traits (Costa & McCrae, 1992; Costa & McCrae, 1995). For this research, we have decided on several factors determining whether we can use a particular tool. These factors were:

- the tool should be openly available for research purposes
- the tool should allow CAWI-based<sup>8</sup> surveys
- the tool should have been adapted to the English language due to the international specifics of the study
- the tool should allow easy integration with other parts of the questionnaire

One of the first choices was to use a validated and adapted tool from the respected entity. The choice was to investigate a questionnaire prepared by PTPPTP<sup>9</sup> - NEO-FFI (Costa et al., 1998). This questionnaire is an adaptation of The NEO personality inventory manual designed by Paul Costa and Robert McCrae (Costa & McCrae, 1992). However, this tool has a few major limitations:

- one must pay for the tool to be used
- it can not be freely adapted to CAWI since it is provided in a proprietary form
- it is provided in Polish language only

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<sup>8</sup> Computer Assisted Web Interviewing

<sup>9</sup> Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego

- it is hard to integrate with the online tools (e.g., Qualtrics, SurveyMonkey, and similar)<sup>10</sup>

Due to the mentioned issues, it was decided to check for alternatives. One of the options was to use the TIPI<sup>11</sup> questionnaire (Gosling et al., 2003). This tool is an excellent choice for short, online studies. It is extremely short (just 10 items), freely available, and does not require authors' permission for its usage (Gosling, 2003). Unfortunately, its biggest asset (being extremely short) might be considered a drawback. Validity and reliability are generally concerned with the shortening of instruments (Rolstad et al., 2011). This is why a different, freely available tool was considered - The Big Five Inventory<sup>12</sup> (John et al., 1991; John et al., 2008). This tool consists of 46 straightforward statements. Even though it is four times longer compared to TIPI, it is still worth considering for online studies as it correlates way better with NEO-FFI. The convergence values for TIPI/NEO-FFI and BFI/NEO-FFI are shown in Table 1.

**Table 1**

*BFI, TIPI, and NEO-FFI Convergent Validity*

Measure	E	A	C	N	O	Mean
BFI	.83	.98	.95	.93	.90	.95
TIPI	.48	.39	.66	.61	.52	.53

Note. E-Extraversion, A-Agreeableness, C-Conscientiousness, N-Neuroticism, O-Openness

Very high values of convergent validity for BFI were the main factors that influenced the choice of the tool for the study. Summarizing, BFI satisfied all the requirements that were initially defined:

- it is a free-to-use questionnaire
- it has its adaptation for CAWI surveys

<sup>10</sup> Qualtrics, SurveyMonkeys, Google Forms, Typeform are de facto standard for CAWI surveys

<sup>11</sup> Ten Item Personality Inventory

<sup>12</sup> The complete questionnaire used in the study was provided as an Appendixes A - D



- it is written using English as its primary language
- it is straightforward to integrate the BFI with other parts of the questionnaire used for the study

BFI constituted the first part of the study - measuring every participant's level of personal traits. The second part of the questionnaire measured respondents' recruitment preferences.

### **Means of Measuring Recruitment Process Preferences**

To determine which recruitment processes are preferred by participants, it was decided that the number of options should be limited to a set of most commonly used recruitment processes within the IT sector. These processes were chosen from the types that provide the most accurate forecasting of future employee performance. According to a meta-analysis of various means of recruitment processes (Schmidt & Hunter, 1998; Schmidt, 2016), following means of measuring candidate's qualifications have given the best overall results - (validity): General Mental Ability tests (.65), Employment Interviews – structured and unstructured (.58), Job Knowledge Tests (.48), Job Tryout Procedure – homework (.44), Knowledge-Based Situational, Work Sample Tests (.33), Judgment Tests (.26). Some of them were disregarded as problematic to implement during recruitment process procedures (e.g. GMA tests). It was already stated in previous sections that asking people to take psychometric tests is a hard-to-implement activity. It was decided to focus on the following means of recruitment:

- discuss GitHub projects - as an example of a work sample test
- solve a problem at home - as an example of a job tryout procedure
- discuss your past projects - as an example of an unstructured employment interview
- job interview - as an example of a structured employment interview
- live coding - as a knowledge-based situational work sample
- pair programming with the interviewer - as a job tryout procedure (requiring cooperation)

These processes were based on standard IT recruitment processes used, among others, by corporations like Google<sup>13</sup> or Amazon<sup>14</sup>. When it comes to focusing on a GitHub platform, as well as other social platforms, it becomes a standard recruitment procedure - “The online recruiter Jobvite found that in a survey of 115 small and medium-sized businesses, 78% used social networking in their recruiting efforts, with the top three sites being LinkedIn, Facebook, and Jobster” (Hayes et al., 2009, p. 114). Capiluppi mentions the same trend in his work - “In 2009, 48% of the Inc. 500 companies have used social media sites for recruitment and candidate evaluation” (Capiluppi et al., 2013, p. 1). This is why it was decided to ask about this means of acquiring information about candidates.

Despite having a list of possible choices, it was still debated how to ask participants about their preferences, which scale, and what form of questions to use to get the actual preferences of respondents.

### **Asking Respondents to Choose the Most Preferred Recruitment Processes**

Designing a questionnaire for a paper-pencil study gives us complete control over the content, the way it is presented during the study, and the control over the layout of the page. Unfortunately, we do not have this comfort while preparing the questionnaire for an online study. Here, it depends on the device parameters that will be used to fill out the questionnaire. Let us briefly examine two trendy brands on the mobile market - Apple<sup>15</sup> and Samsung<sup>16</sup>. The size of the screens (diagonal) for devices manufactured by these companies can range from 6.1" to 7.6" for the phone size and from 7.9" to 14" for the tablet size, not to mention the computer screen size - typically 19" to 27" (diagonal). This means that whenever we make a choice related to the design of the questionnaire, we have to pay extra attention to what people can see on their screens. This is why testing the questionnaire and aiming for the

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<sup>13</sup> <https://www.google.com/about/careers/applications/how-we-hire>

<sup>14</sup> <https://aws.amazon.com/careers/how-we-hire>

<sup>15</sup> [https://support.apple.com/en\\_US/specs/iphone](https://support.apple.com/en_US/specs/iphone)

<sup>16</sup> <https://www.samsung.com/levant/smartphones/>

smallest screen size possible is essential. This way, we can avoid a situation where people cannot see the full content of the question being asked. Fortunately, the *qualtrics XM* platform provides this functionality. The questionnaire used for this study was analyzed regarding the layout quality for both regular screen size (computer screen) and mobile screen. For both, all the information was visible to respondents. Once we know how to fit the content on the screen, we have to decide how to ask about respondents' preferences.

Selecting a proper scale for gathering information from respondents might pose a challenge. Likert scales (Likert, 1932) are probably the most common means of measuring respondents' attitudes. However, they pose a few problems. It might happen that people decide to avoid answering questions and choose responses from the middle of the range. This way, it does not give away actual preferences (Brown, 2000). This can happen in the case of an odd number of choices. In questions of that type, people can avoid answering by choosing that they are not overly in favor or strongly opposed. This problem can be solved by selecting an even number of choices, but still, respondents may revolve around middle values (e.g., average between smallest preference for and against the choice). Also, it may happen that respondents will continuously choose answers from either side of the scale. There might also be problems with deciding whether distances between choices are linear. Bishop shows that selecting a particular wording may affect the distances between choices because two words may imply a lower or higher value of the distance between the choices (Bishop & Heron, 2015). This way, the scale might not be suitable for statistical analysis. Eventually, it was decided that a different approach would be taken while collecting data for this study.

To determine respondents' preferences, we have decided to use best-worst scaling. In this type of questionnaire (Louviere et al., 2013), respondents are presented with multiple questions, each consisting of a few options. Respondents must choose the best and worst options from the presented choices list.

***Best-worst Scaling***

Best-worst scaling, also known as *MaxDiff*, *case 1 best-worst scaling*, or *object case best-worst scaling*, is widely used in marketing research (Louviere et al., 2013). Asking questions about clients' preferences towards product design, web page layout, and color schemes can be easily solved using the best-worst scaling method. It is worth noting that this method constantly gains more popularity across various fields of science, including human science (Schuster et al., 2024). According to an analysis of 526 publications conducted by Anne L. R. Schuster and other co-authors of the paper:

Best-worst scaling (BWS) is a theory-driven choice experiment to prioritize a finite number of options. Within the prioritization context, BWS is sometimes called differently: MaxDiff, BWS object case, and BWS Case 1. Now used in numerous fields, we conducted a transdisciplinary literature review of all published applications of BWS focused on prioritization to compare norms on the development, design, administration, analysis, and quality of BWS applications across fields. We identified 526 publications published before 2023 in the fields of health (n = 195), agriculture (n = 163), environment (n = 50), business (n = 50), linguistics (n = 24), transportation (n = 24), and other fields (n = 24). The application of BWS has been doubling every four years. (Schuster et al., 2024, p. 1)

In social and psychological questionnaires, like the one used in this study, we required people to choose alternatives. As White states in his work

Important social and psychological processes require people to choose between alternatives. A high school, for example, might need new chemistry equipment and updated books—but the budget only supports one or the other. In politics, people say they are highly supportive of equality and freedom—but what about when these values come into conflict? (White, 2021, p. 3)

This is exactly the case in this study. Recruitment processes can pose a conflict - for example, it is impossible to design a recruitment process that involves all the possible choices to some extent. The decision must be made on what type of process is applied for a given position at the company. On the other hand, we were looking for optimal choices for respondents. Which particular recruitment processes were the most preferred by participants of the study? This is why the decision was made to use MaxDiff-based questionnaires instead of Likert scales.

### ***MaxDiff Questionnaire Design***

MaxDiff questionnaires should follow design practices that make them suitable for research. Each question consists of a list of choices. Questions are designed so that every option is presented with other, different choices in multiple combinations. “BWS implies use of multiple comparison sets, with each set having at least three objects/items (...) most BWS applications design choice (comparison) sets with balanced incomplete block designs” (Louviere et al., 2013, p. 8). In the case of this research, it was decided to design a fully orthogonal plan where all the choices were presented over 15 questions, each consisting of 4 choices, and every choice was shown 6 times.

While using BWS, it is worth following the best design practices. Showing all the possible choices and all possible combinations to participants is unreasonable. For example, presenting all possible combinations of 6 alternatives, with 4 of them shown in each question, would require 360 questions (Kuhfeld, 2010). This would be highly unreasonable. This is why a reduced number of questions are shown while paying attention to a design:

From a complete list of possible combinations, suitable designs can be created manually by judiciously balancing several criteria, viz. the number of scenarios involving high and low (assumed) utility values, low correlation of attributes (orthogonality), balanced representation, and minimum overlap of levels (...) Rather than manually developing

a design, researchers can use automated (often computerized) procedures. (Mühlbacher et al., 2016, p. 4)

It was checked that alternatives are presented in the desired way and are shown exactly the same number of times Table 2.

**Table 2**

*Frequency of Every Alternative in the MaxDiff Design*

Alternative	A1	A2	A3	A4	A5	A6
A1	10	-	-	-	-	-
A2	6	10	-	-	-	-
A3	6	6	10	-	-	-
A4	6	6	6	10	-	-
A5	6	6	6	6	10	-
A6	6	6	6	6	6	10

Note. Alternatives are A1 - discuss GitHub projects, A2 - solve a problem at home, A3 - discuss your past projects, A4 - a job interview, A5 - whiteboard coding, and A6 - pair programming with an interviewer.

It was also checked how alternatives are correlated with each other (see Table 3).

**Table 3**

*Correlation of Alternatives Inside MaxDiff Plan*

Alternative	A1	A2	A3	A4	A5	A6
A1	1.0	-	-	-	-	-
A2	-0.2	1.0	-	-	-	-
A3	-0.2	-0.2	1.0	-	-	-
A4	-0.2	-0.2	-0.2	1.0	-	-
A5	-0.2	-0.2	-0.2	-0.2	1.0	-
A6	-0.2	-0.2	-0.2	-0.2	-0.2	1.0

Note. Alternatives are A1 - discuss GitHub projects, A2 - solve a problem at home, A3 - discuss your past projects, A4 - a job interview, A5 - whiteboard coding, and A6 - pair programming with an interviewer.

Appendix D presents the complete MaxDiff plan, as shown to respondents. It was prepared based on the above design plan (Table 3).

Once data is collected, the results of MaxDiff questions can be analyzed using dedicated *R* packages. At least two *R* packages can be used to run this type of analysis: *bwsTools* (White, 2021) and *support.BWS* (Aizaki & Fogarty, 2023). The exact way of analyzing the results of MaxDiff is discussed in further sections of the thesis.

### Results

The results were analyzed using SPSS (Version 29.0.0.0), RStudio (Version 2023.12.1+402), and *R* (Version 4.3.2). MaxDiff results were calculated using *bwsTools* (Version 1.2.0). The scripts used during data analysis are part of study supplement<sup>17</sup>.

### Demographics of the Respondents

Participants were recruited through various means of Internet communication: e-mail, company Intranet, IT-related forums, LinkedIn, and a dedicated web page. Seventy-six participants (65.8% Male, 30.3% Female, 3.9% Prefer not to say) were included in the study. Most participants identified as people with IT-related experience (80.3% yes, 19.7% no). Respondents have identified themselves as Software Engineers (46.1%), Project Managers (7.9%), System Architects (7.9%), Business Analysts (3.9%), Support Team members (6.6%), and other/no answer (27.6%). The structure of team sizes reported by respondents is presented in Table 4.

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<sup>17</sup> <https://github.com/mkowsiak/big5hr>

**Table 4***Declared Size of the Team as Stated by Participants*

	Team size	Percentage
I typically work alone		17.1
2 - 4 people		35.5
5 - 12 people		34.2
13 - 25 people		6.6
26 - 50 people		3.9
> 50 people		2.6
Total		100

The Demographic part of the questionnaire contains questions related to age, gender, mother tongue, experience related to IT projects, and the size of the team respondents work in. Due to procedural error, the question related to age was not asked in the final version of the questionnaire distributed to participants. Information related to age was not recorded in the final survey. Even though this information was not asked for in the final version of the survey, it is possible to estimate the age of respondents based on the largest group. The corporation with the most respondents publishes yearly reports containing information related to the demographics of the company's employees. Based on the report, it is possible to estimate the weighted average age of respondents to be 38.6 (SD = 11.4). It is also possible to estimate the weighted average age of professional developers based on the results of the *2023 Developer Survey* conducted by *Stack Overflow* portal<sup>18</sup>. *Stack Overflow* is one of the biggest Q&A portals for IT teams. Based on the results of the study conducted in the year 2023, we can calculate that the average weighted age for a professional developer was 33.9 (SD = 10.0).

<sup>18</sup> <https://survey.stackoverflow.co/2023/#developer-profile-demographics>



### Analysis of the BFI Levels Distribution

To validate the distribution normality of all independent variables, scores across BFI scales (extraversion, neuroticism, agreeableness, conscientiousness, openness to experience), two tests were applied: Shapiro-Wilk Test and Kolmogorov-Smirnov Test (see Table 5). For each variable, the results of both tests were calculated, and based on the results, it was decided how relationships between BFI scores and scores for recruitment process preferences selected by respondents would be calculated. Later on, during the data analysis, either the *t*-test was used (for normally distributed variables) or Mann-Whitney U (for variables that were not normally distributed).

**Table 5**

*Test of Normality of BFI Scores - Extraversion, Neuroticism, Agreeableness, Conscientiousness, Openness*

BFI scale	Kolmogorov-Smirnov		Shapiro-Wilk	
	Statistics	p	Statistics	p
Extraversion	.098	.070	.986	.554
Agreeableness	.068	.200	.982	.356
Conscientiousness	.076	.200	.987	.614
Neuroticism	.073	.200	.979	.251
Openness	.080	.200	.965	.034

For all BFI scales, the K-S test statistics were not statistically significant ( $p > 0.05$ ), indicating no significant deviation from normality. Therefore, the assumption of normality was met for all BFI scores. However, the S-W test statistics for openness were statistically significant ( $p = 0.034$ ); thus, it was decided to calculate the relationship between openness and recruitment process preferences using the Mann-Whitney U (2 samples) Test. The independent samples *t*-test was used for other BFI scores, such as extraversion, neuroticism,

agreeableness, and conscientiousness. Consequently, parametric statistical tests were deemed appropriate for further analysis.

We have created two segments within BFI scales for each BFI factor (based on the median of the scores):

- extraversion: solitary/reserved and outgoing/energetic
- neuroticism: resilient/confident and sensitive/nervous
- agreeableness: critical/rational and friendly/compassionate
- conscientiousness: extravagant/careless and efficient/organized
- openness: consistent/cautious and inventive/curious.

Questionnaires with a BFI score equal to the median were not considered during calculations.

### **Analysis of MaxDiff Results**

MaxDiff questionnaire results were calculated using the bwsTools package (White, 2021). Two different types of results were calculated: individual and aggregated. Individual scores were calculated to determine the personal preferences of respondents. These scores were used later to test whether there is any relationship between personality traits and recruitment preferences. The Bayes Method was used to calculate individual best-worst scores. These scores were later used in the Mann-Whitney U (2 samples) test and the independent samples *t*-test as dependent variables. These results are discussed in the next section. To illustrate how respondents choose their preferred recruitment processes, the total number of choices - best and worst - were collected in Table 6.

**Table 6***Number of Best and Worst Choices for Each Item*

Recruitment process	Total	Best	Worst
Discuss GitHub projects	760	121	115
Discuss your past projects	760	336	47
Job interview	760	168	156
Pair programming with an interviewer	760	72	327
Solve a problem at home	760	401	95
Whiteboard coding	760	42	400

Note. Total - total number of times given item was shown to respondents, Best - number of times the item was chosen as best option, Worst - number of times the item was chosen as worst option.

In addition to individual scores, aggregated scores were calculated as well. Analytical estimation of the multinomial logistic model was used to calculate the aggregate scores

**Table 7***Regression Coefficient for the Multinomial Model*

Recruitment process	b	se	lb	ub	P( X )
Discuss GitHub projects	0.01	0.05	-0.08	0.11	0.13
Discuss your past projects	0.80	0.05	0.69	0.90	0.29
Job interview	0.03	0.05	-0.06	0.13	0.13
Pair programming with an interviewer	-0.69	0.05	-0.80	-0.59	0.06
Solve a problem at home	0.85	0.05	0.74	0.96	0.31
Whiteboard coding	-1.02	0.05	-1.13	-0.90	0.04

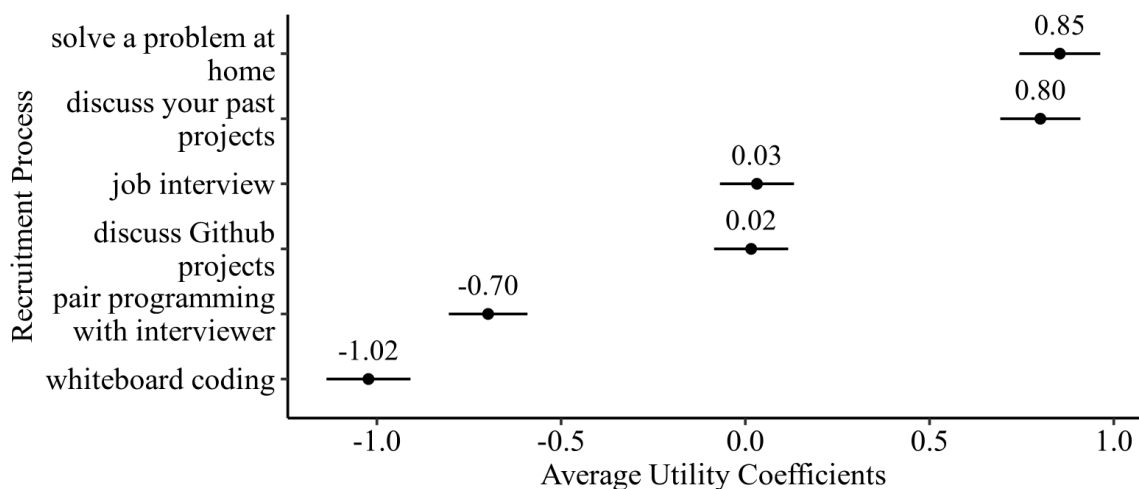
Note. b - regression coefficient for the multinomial model, se - the standard error, lb/ub - lower and upper bounds, P( X ) - the choice probability for each item.

(White, 2021). This way, it was possible to answer the question: What are the most preferred options selected by respondents? In the case of this study, the answer refers to preferences toward various recruitment processes (see Table 7).

The regression coefficient can be used to represent the overall preference of the choice. Negative values represent cases chosen as worst, while positive values indicate cases chosen as best. To illustrate the results of aggregated preferences and make it more clear how preferences were distributed over the types of recruitment processes, they were plotted on a chart (see Figure 1).

**Figure 1**

*Aggregated Preferences Towards Specific Recruitment Processes*



Note. The graph shows the aggregated preferences of respondents towards every recruitment process. The smaller the value on the X-axis, the less preferred choice was. The bigger the value on the X-axis, the more the preferred choice was.

### Confirmation of Research Questions

We have tested both research questions formulated in this work:

- Do extraverts and introverts have different preferences towards particular recruitment processes?

- Do open and closed people have different preferences towards particular recruitment processes?

The first question was tested using the *t*-test, and the second using the Mann-Whitney U test.

A one-tailed independent samples *t*-test was conducted to examine the difference in different recruitment processes between solitary/reserved and outgoing/energetic groups. Results revealed a significant difference between the two groups when it comes to Discussing GitHub projects  $t(74) = 3.491$ ,  $p < .001$  and Job interview  $t(74) = -2.824$ ,  $p = 0.003$ . The mean preference level towards Discussing GitHub projects for the solitary/reserved group was  $M = .161$  ( $SD = .322$ ), whereas the mean value for the outgoing/energetic group was  $M = -.120$  ( $SD = .379$ ). Regarding the Job interview process, the solitary/reserved group score was  $M = -.106$  ( $SD = .464$ ), while for the outgoing/energetic group, it was  $M = .187$

### Table 8

*Preferences Towards Particular Types of Recruitment Processes - Extraverts vs. Introverts (t-test)*

Recruitment process	t	df	p
Discuss GitHub projects	3.4	74	<.001
Discuss your past projects	-1.1	74	.122
Job interview	-2.8	74	.003
Pair programming with an interviewer	.5	74	.309
Solve a problem at home	1.0	74	.144
Whiteboard coding	-.2	74	.420

Note. The significance level is 0.050.

( $SD = .447$ ). These findings suggest that extraverts prefer to participate in a recruitment process requiring interviewer interaction. In contrast, introverts prefer to focus on a process where this interaction is limited, and the environment (e.g., a private project at GitHub) is well known. Importantly, the effect size was also examined, with Cohen's  $d = .801$ , indicating

a large effect size for Discussing GitHub projects, and  $d = -.648$ , indicating a medium effect size for a regular Job interview (see Table 8).

Mann-Whitney U test was conducted to examine the difference in different recruitment processes between consistent/cautious and inventive/curious groups. Results revealed no significant differences between the two groups regarding all the recruitment processes (see Table 9). This result is quite counterintuitive as one might have expected that people open to a new experience should actively participate in activities like Whiteboard coding or Discussing past projects where lots of new information can be gained by both interviewer and interviewee. This aspect will be further discussed later in the thesis.

**Table 9**

*Preferences Towards Particular Types of Recruitment Processes - Open vs. Closed*

*(Mann-Whitney U test)*

Recruitment process	Mann-Whitney U	p
Discuss GitHub projects	499.0	.129
Discuss your past projects	578.5	.552
Job interview	715.5	.322
Pair programming with an interviewer	643.0	.880
Solve a problem at home	596.5	.694
Whiteboard coding	712.0	.337

### **Additional Analyses**

Even though it was not part of the thesis scientific questions set, it was decided to examine whether other components of the Big Five inventory impact respondents' choices. Since agreeableness, conscientiousness, and neuroticism were normally distributed, a *t*-test was used to check whether there were differences between subsets of Big Five inventory factors and recruitment preferences.

Subsequent analyses were conducted to check slightly different Big Five inventory factors aspects. The question here was: How much does a change in factor level impact changes in recruitment process preferences? We validated this question using correlation analysis, which was applied to all the Big Five inventory factors and all preferred recruitment choices.

***Neuroticism, Agreeableness, Conscientiousness, and Recruitment Processes***

Initially, it was assumed that extraverted people open to new experiences are the best fit for new positions. However, the question here is. What if, for any reason, we are looking for people who are agreeable, conscientious, and neurotic? Is there a way to shape the recruitment process such that it will promote or demote certain factors of a personality? Other factors were analyzed using a *t*-test for completeness (see Table 10).

**Table 10**

*Group Differences of Recruitment Processes Preferences - Neuroticism, Agreeableness, Conscientiousness*

Recruitment process	t	df	p
<b>Neuroticism</b>			
Discuss your past projects	2.681	74	.005
<b>Agreeableness</b>			
Solve a problem at home	-2.029	70	.023
Whiteboard coding	2.366	63.371	.011
<b>Conscientiousness</b>			
Whiteboard coding	1.181	74	.036

Mean values of the preference for the given recruitment process were also calculated (see Table 11).

**Table 11***Group Statistics of Personality Traits Combined with Recruitment Processes Preferences*

Personality / Recruitment process	Mean	SD
Neurotic / Discuss your past projects		
resilient / confident	.956	.429
sensitive / nervous	.689	.438
Agreeable / Solve a problem at home		
critical / rational	.738	.648
friendly / compassionate	1.00	.455
Agreeable / Whiteboard coding		
critical / rational	-.870	.568
friendly / compassionate	-1.146	.406
Conscientiousness / Whiteboard coding		
extravagant / careless	-.901	.530
efficient / organized	-1.10	.458

Note. The table contains mean values of recruitment process preferences, as stated by respondents, depending on the type of respondents' personality.

Based on the results in Table 11, emotionally stable people are more willing to discuss past projects  $M = .956$  ( $SD = .429$ ) compared to neurotic ones  $M = .689$  ( $SD = .438$ ). Agreeable people tend to be more willing to complete problem-solving tasks assigned as homework  $M = 1.0$  ( $SD = .455$ ) compared to critical/rational respondents  $M = .738$  ( $SD = .648$ ). Agreeable people are much more against whiteboard coding processes  $M = -1.146$  ( $SD = .406$ ) than disagreeable people  $M = -.870$  ( $SD = .568$ ), which sounds counterintuitive. The same applies to groups of organized  $M = -1.10$  ( $SD = .458$ ) and careless  $M = -.901$  ( $SD = .530$ ) people. Surprisingly, organized people are against whiteboard coding, even though this process would allow them to show off their natural tendency to have things organized.



***Correlation between levels of BFI factors and Recruitment Processes***

Correlation analysis was another way of getting insight into data. It was conducted to determine whether there is a linear relationship between Big Five Inventory traits and Recruitment Process preferences (see Table 12).

**Table 12**

*Correlation Analysis: Recruitment Processes vs. Extraversion and Openness Traits*

Variables	1	2	3	4	5	6	7	8
BFI factors								
1. Extraversion	-							
2. Openness scale score	.225	-						
Recruitment processes								
3. Discuss GitHub projects	-.404**	-.071	-					
4. Discuss your past projects	.219	-.087	-.196	-				
5. Job interview	.358**	.014	-.365**	.302**	-			
6. Pair programming	-.096	.076	-.055	-.323**	-.370**	-		
7. Solve a problem at home	-.189	.021	.119	-.258*	-.406**	-.338**	-	
8. Whiteboard coding	.047	-.001	-.336**	-.351**	-.172	.135	-.297**	-

Note. E - Extraversion, O - Openness for experience, N - Neuroticism, A - Agreeableness, C - Conscientiousness; Pair programming - Pair programming with interviewer

\* $p < .05$ . \*\* $p < .01$ .

The results of the correlation analysis confirmed the findings related to extraversion based on group analysis. While the extraversion level grows, interest in discussing GitHub projects decreases, and the interview preferences score increases. There is no significant correlation with any of the recruitment processes regarding openness. This might explain why there were no significant group differences in recruitment process scores. However, what is interesting here is that some processes are positively correlated while others are negatively correlated.

This might indicate that mixing particular types of recruitment processes does not make much

sense. For example, it seems reasonable to include a discussion on past projects within a job interview, while discussing GitHub projects does not make much sense. Whiteboard coding is an exception - it looks like both MaxDiff results and correlation analysis show that nobody likes this kind of recruitment process. What is interesting is that Whiteboard coding is a recruitment technique that is widely used (see *Means of Measuring Recruitment Process Preferences*).

### **Discussion of the results**

The study has shown that there are statistically significant differences in preferences related to the recruitment process depending on BFI traits. The study was limited to some extent, and factors that impacted it are also discussed. Eventually, we talk about the practical application of the results and how the study can be modified to provide additional insight into BFI in the recruitment process.

### **Discussion**

The results of the study are not definite. It turns out that preferences towards particular recruitment processes are not linked with Big Five personality traits. There are only some significant differences between extraverts and introverts, and none between open and closed people in choosing preferred recruitment processes. There is also little or no correlation between BFI factors and preferred recruitment processes. Interestingly, though, people tend to dislike recruitment processes involving testing their knowledge and work technique whenever these activities are performed live during the recruitment process. This preference spans over all the Big Five Inventory traits. It seems that no matter what the personality of a future employee is, he/she will not like live coding in any form. On the contrary, most people want to talk about their past projects and solve problems in their spare time. This might indicate what recruitment processes should be used to make a recruited person most comfortable during the recruitment process. Notably, classic, structured interviews and discussions related

to GitHub projects have moderate interest levels. Since the question about private GitHub projects was not asked, it is hard to conclude whether reluctance towards discussing GitHub projects is related to the fact that extraverted people simply do not work on private projects in their spare time or whether this is something else. Surprisingly, openness to experience was not correlated with any of the preferred recruitment processes. There were also no group differences in terms of preferences towards recruitment processes. One may explain that with a statement that open-minded people are not focused on a particular process and can find almost everything interesting. Costa and McCrae (2008) described how each Big Five factor is seen in the person. They define openness as:

Openness. In experiential style, this individual is described as being generally open. She has a vivid imagination and an active fantasy life. She is particularly responsive to beauty as found in music, art, poetry, or nature, and her feelings and emotional reactions are varied and important to her. She enjoys new and different activities and has a high need for variety in her life. She has a moderate level of intellectual curiosity and she is generally liberal in her social, political, and moral beliefs. (Costa & McCrae, 2008, p. 244)

This may explain why people open to experience are not focused on a particular recruitment process.

### **Challenges and Limitations**

The study was conducted as precisely as possible. However, some limitations might have impacted the results. The first and foremost issue concerns a procedural error and omitting questions about respondents' ages. Even though the effort was put into making this information as close to reality as possible, it is still an estimate. In the case of study replication, it should be assured that this question is properly asked.

Another limitation comes from the study formula. CAWI-based questionnaires pose a risk of being abused in some forms. Since nobody accompanies respondents during the

study, there is always a risk that people will pick the most suitable and quickest way to answer questions. This problem was, to some extent, addressed in the study by applying a MaxDiff-based questionnaire instead of a Likert scale. Randomized order of presentation and shuffled positions within the questions require constant attention while questions are answered. On the other hand, CAWI-based studies can lead to more sincere answers due to the anonymity of respondents and lack of a desire for social approval (Joinson, 1999).

It was assumed that IT specialists knew the English language sufficiently. However, it is hard to determine how accurately non-English-speaking respondents understood BFI statements. Although providing language adaptation for each non-English-speaking respondent might be useful, it would exceed the scope and resources allocated for this study.

The study was based on a relatively small sample. It would be extremely beneficial if replications were done with a larger sample size. The main issue here is that it is hard to find English-speaking IT specialists willing to dedicate their time to go through the research-oriented questionnaire. Even though several recruitment sources were used during the study, it sounds like a well-known trademark is the key. With 14 million registered users, Stack Overflow collected over 80 thousand responses to their annual survey. However, it is still worth noting that the first survey only acquired 2 thousand responses. Of course, there is no way to compare a one-time study like this one to one run by one of the most recognizable social platforms for IT professionals.

There is one more limitation worth mentioning. Twenty surveys were not completed, and there is no clear indication of why respondents did not finish. The lack of response might have been triggered by a lack of time, moderate knowledge of the English language, or no interest in the subject. Unfortunately, there was no way to ask people who abandoned the questionnaire why they quit.

Even though the study had some limitations, it still poses a potential for practical application.

### **Practical Application**

We have learned that extraverts and open people perform better at work (Gatzka, 2021; Wilmot et al., 2019). Unfortunately, this study does not answer whether there are clear preferences toward recruitment processes regarding open personalities. On the other hand, we have learned that extraverted people prefer a classic, structured interview over discussing their own personal projects developed in their free time. It was not asked whether participants have their personal projects on portals similar to GitHub; thus, it is hard to say whether this negative preference towards discussing GitHub projects is a result of not having this kind of project in respondents' portfolio or whether it is a matter of choosing more socially engaging activities over spending time on personal projects. Costa and McCrae (2008) define extraversion as:

Extraversion: This person is rated as being somewhat formal and distant in her relationships with others, but she usually enjoys large and noisy crowds or parties. She is seen as being forceful and dominant, preferring to be a group leader rather than a follower. The individual is described as having a high level of energy and likes to keep active and busy. Excitement, stimulation, and thrills have great appeal to her, and she frequently experiences strong feelings of happiness and joy. (Costa & McCrae, 2008, p. 244)

Extraverted people do not like spending time on mostly solitary activities, and developing personal projects on a GitHub platform can be treated as such. Thus, the classic interview is the most suitable approach if the HR department is looking for extraverted people. On the other hand, if we decide we are looking for someone who works mostly independently and does not require many interactions, leaning toward discussing GitHub projects might sound like a good idea.

As already mentioned, we have conducted further examination of the data to determine whether other aspects of personality impact the preferences toward particular recruitment processes. It is worth noting that these results can be applied to HR-related processes. It is worth considering giving people a short homework assignment as part of the recruitment process. First, it was one of the most regarded recruitment processes, and secondly, it was regarded as the preferred one by agreeable people. Very popular whiteboard coding tasks should be reconsidered as a good practice. They pose a risk to the recruitment process. First, they are regarded as the worst possible choice (next to pair programming with a recruiter) and are preferred by critical and disagreeable personalities. The question is whether we want disagreeable people on board.

Even though the results of this study are not fully conclusive, we think they might be a hint for HR departments responsible for shaping recruitment processes. Depending on the personality type we are looking for, it is (to some extent) possible to choose the most preferred process.

### **Further Study**

While thinking of how to design and replicate the study differently, one may consider changing the form of a study a little bit. This study was conducted using typical tools used for scientific research. An online survey was designed and delivered using a well-established yet very typical form imitating paper and pencil studies. The question here is: What would the response be from the possible respondents if the process was delivered as an online game or a process where gamification practices were applied? This question is especially interesting in how modifying the way processes were presented might have impacted survey responses. The study required that respondents actively imagine each and every process. However, how would it look if people were presented with a simulation of a process or a short animated movie presenting the process? Would it impact their preferences towards different processes?

Studies show that gamification may increase attention and enjoyment when completing the survey. This is quite a helpful finding, especially in the case of surveys with a moderately large number of questions, like this study (Triantoro et al., 2020).

### **Concluding Remarks**

This study has shown that personal traits affect recruitment processes only to a small extent. There are no clear boundaries for most processes regarding personality traits. It seems like a regular structured job interview is still the best option if we are looking for extraverted employees. On the other hand, the study has shown that there are personality-independent preferences towards recruitment processes in general. This aspect of the study might be particularly interesting for people who are participating in recruitment processes.

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## **Appendix A - Questionnaire - Intro and Consent**

The Effects of Extraversion on Recruitment Process Preferences as Declared by Respondents

It should take only 15-20 minutes to answer all the questions. The aim of this research is to analyze whether personality traits (e.g. extraversion, introversion) affect recruitment process.

Once you have completed the survey you will be able to learn whether you are agreeable, an extravert or an introvert, to what extent you are a conscious person and how open you are to new experiences. This information will be available to you as soon as results of the survey are processed.

This survey is anonymous and no personal data is collected during this study. You will be given a unique ID (at the very end of the survey) that allows you to learn about the outcome of your choices. This ID in no way allows you to identify you. Only you know it.

With anonymity being an integral part of this very survey, your right to privacy will be also preserved while the results of the analysis are published.

Do you agree to participate in this survey? YES/NO

**Appendix B - Questionnaire - Demographics Section**

01. What is your sex?

- Male
- Female
- Non-binary / third gender
- Prefer not to say

02. What is your age?

- \_\_\_\_\_
- Prefer not to say

03. What is your mother tongue?

- \_\_\_\_\_
- Prefer not to say

04. Do you have experience working on IT projects?

- Yes
- No

05. What was your primary focus or role in the last IT project you worked on?  
Please

select one you identify most with.

- Software Engineer
- Human Resources
- Project Manager
- System Architect
- Business Analyst
- Tester
- Support Team
- Other

06. What is the number of people you typically cooperate with?

- I typically work alone
- 2 - 4 people
- 5 - 12 people
- 13 - 25 people
- 26 - 50 people
- > 50 people
- Prefer not to say

### Appendix C - Questionnaire - BFI<sup>19</sup>

Here are some statements that may or may not describe what you are like. Below each statement, choose the number that shows how much you agree or disagree that it describes you.

For example, do you agree that you are someone who is bossy? Write a 5 if you agree strongly, a 4 if you agree a little, a 3 if you neither agree nor disagree, a 2 if you disagree a little, or a 1 if you disagree strongly.

There are no "right" or "wrong" answers, so select the number that most closely reflects you on each statement. Take your time and consider each statement carefully.

You are allowed to use a dictionary if you don't know what a word means!

I see myself as someone who...	Choose from 1 - 5
- is talkative	_____
- tends to find fault with others	_____
- does things carefully and completely	_____
- is depressed, blue	_____
- is original, comes up with new ideas	_____
- reserved; keeps thoughts and feelings to self	_____
- is helpful and unselfish with others	_____
- can be somewhat careless	_____
- is relaxed, handles stress well.	_____
- is curious about many different things	_____
- is full of energy	_____
- starts quarrels with others	_____
- is a reliable worker	_____
- can be tense	_____
- is clever, thinks a lot	_____
- generates a lot of enthusiasm	_____
- has a forgiving nature	_____
- tends to be disorganized	_____
- worries a lot	_____
- has an active imagination	_____
- tends to be quiet	_____
- is generally trusting	_____
- tends to be lazy	_____
- doesn't get easily upset, emotionally stable	_____
- is creative and inventive	_____
- takes charge, has an assertive personality	_____
- can be cold and distant with others	_____
- keeps working until things are done	_____
- can be moody	_____
- likes artistic and creative experiences	_____
- is sometimes shy, inhibited	_____
- is considerate and kind to almost everyone	_____
- does things efficiently (quickly and correctly)	_____
- stays calm in tense situations	_____
- likes work that is the same every time (routine)	_____

<sup>19</sup> Please note that the BFI Questionnaire was based on the original work of Olivier P. John - <https://www.ocf.berkeley.edu/~johnlab/bfi.htm>; BFI is not in the public domain per se. However, it is freely available for researchers to use for non-commercial research purposes.

- is outgoing, sociable \_\_\_\_\_
- is sometimes rude to others \_\_\_\_\_
- makes plans and sticks to them \_\_\_\_\_
- gets nervous easily \_\_\_\_\_
- likes to think and play with ideas \_\_\_\_\_
- doesn't like artistic things (plays, music) \_\_\_\_\_
- likes to cooperate; goes along with others \_\_\_\_\_
- is easily distracted; has trouble paying attention \_\_\_\_\_
- knows a lot about art, music, or books \_\_\_\_\_
- is the kind of person almost everyone likes \_\_\_\_\_
- people really enjoy spending time with \_\_\_\_\_



### Appendix D - Questionnaire - MaxDiff

Imagine you are taking part in a recruitment process. Imagine a situation where you are trying to find a new job.

You will be presented with various situations that may happen during this recruitment process:

---

<b>discuss GitHub projects</b>	- where the interviewer talks about your projects published on GitHub/Gitlab/etc
<b>solve a problem at home</b>	- where interviewer gives you a task and some time to solve it at home
<b>discuss your past projects</b>	- where interviewer (without disclosing secrets) talks about your past projects
<b>job interview</b>	- where the interviewer discusses with you your CV, asks about your motivation, expectations, etc.
<b>whiteboard coding</b>	- where interviewer gives you a task and you solve it live (in person on a whiteboard or on-line)
<b>pair programming with interviewer</b>	- where interviewer actively solves a hypothetical problem with you

---

For each set of situations choose one that you prefer most and one that you don't like most.

Please remember there are no good or bad answers here:

---

select what feels **right** to you on the **right** side of the table  
select what feels **wrong** to you on the **left** side of the table

---

01. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>

02. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

03. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>

04. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

05. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

06. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

07. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>

08. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

09. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

10. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

11. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

12. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>

13. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>

14. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	discuss GitHub projects	<input type="checkbox"/>
<input type="checkbox"/>	discuss your past projects	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>

15. Choose the best and the worst situation during the recruitment process.

Worst		Best
<input type="checkbox"/>	solve a problem at home	<input type="checkbox"/>
<input type="checkbox"/>	job interview	<input type="checkbox"/>
<input type="checkbox"/>	whiteboard coding	<input type="checkbox"/>
<input type="checkbox"/>	pair programming with an interviewer	<input type="checkbox"/>