The Role of Neuroscience Information in Choosing a Personality Test: Not as seductive as expected

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Abstract

There is a large number of different personality tests used by practitioners for selection purposes, many of which are promoted by commercial test publishers and do not measure the Big Five. The present study examined one particular promotion factor used by at least one successful personality test: the influence of a link between the brain and personality on the decision for or against a personality test. This factor was chosen as past research has demonstrated the seductive appeal of neuroscience information on judgments in other areas. Three samples consisting of human resource practitioners, business management students and psychology students rated two versions of a fictitious personality test, one with neuroscience information and one without. Contrary to our expectations, the personality test with neuroscience information was rated more negatively than the same test without this information. Human resource practitioners in particular reacted negatively, whereas psychology students were not influenced by our manipulation.

Keywords: personality tests; personnel selection; science-practitioner gap; neuroimages; fMRI

The Role of Neuroscience Information in Choosing a Personality Test: Not as Seductive as Expected

In recent years, many authors have referred to a persistent, possibly even increasing gap between science and practice (e.g., Anderson, Herriot, & Hodgkinson, 2001; Rynes, Giluk, & Brown, 2007). The field of Industrial and Organizational Psychology faces the particularly troubling problem that scientific findings in human resources (HR) management and recommendations based on these findings are not used in practice (at least not as much as we would hope). A classic example can be found in the field of personnel selection (e.g., Anderson, Lievens, van Dam, & Ryan, 2004; Klehe, 2004; Terpstra & Rozell, 1997): Here, there still seems to be a preference for unstructured procedures like the unstructured interview (e.g., Stephan & Westhoff, 2002), and when structured methods like personality tests are used, these tests often seem to be "poorly chosen" (Hough & Oswald, 2005, p. 375).

Although many authors (e.g., Murphy & Dzieweczynski, 2005) have expressed their unease regarding the success of non-scientific tests and have identified the need to provide practitioners with better advice (Hogan, 2005), almost no research has explored why personality tests with questionable qualities seem to be attractive to practitioners. Many non-research-based personality tests (as well as some research-based tests) are sold by commercial test publishers, which have to promote their tests, and this entails making a choice with regard to positioning and finding a unique and/or emotional selling proposition (Barrena & Sánchez, 2009; Heath, Brandt, & Nairn, 2006; Ries & Trout, 2001; Rossiter & Bellman, 2012). This is especially necessary because, at least in the United States and Western Europe, the test market seems to be highly saturated (Hough & Oswald, 2005; Oakland, 2004). One particularly striking promotion argument is the link between a personality test and the brain, which is used, for example, by the Herrmann Brain Dominance Instrument (HBDI), or even neuroscience information. Such a promotion strategy is consistent with research showing that localization hypotheses attract not only

scientists (e.g., DeYoung et al., 2010) but also the popular press (Racine, Bar-Ilan, & Illes, 2005), and that the brain and neuroscience information seem to be especially seductive (Weisberg, Keil, Goodstein, Rawson, & Gray, 2007). The main purpose of the experiments reported here was to show that a personality test which is promoted with neuroscience information is more attractive than the same test without such a link with the brain.

Background

The gap between research and practice is a well-known phenomenon in Industrial and Organizational Psychology: Scientific findings in HR management – recommendations of management techniques based on established theories and advice – are seldom used in practice, whereas some methods which actually are in use are not well supported by scientific research (Johns, 1993; Rowe, Williams, & Day, 1994; Terpstra & Rozell, 1993, 1997). Scientists and practitioners seem to agree that (a) scientists' research is not always adjusted to practitioners' needs and (b) there is a gap in terms of transferring scientific findings to practice (Shapiro, Kirkman, & Courtney, 2007). Concerns have been raised that this gap is growing, and might be hard to reduce (Anderson et al., 2004; Hodgkinson, Herriot, & Anderson, 2001; Rynes et al., 2007). This implies the troubling effect that academics, and their efforts, may only have a moderate impact outside the world of science and its journals (Abrahamson & Eisenman, 2001).

One special part of the research-practice gap refers to personnel selection (e. g., Anderson et al., 2004; Terpstra, 1996). The literature indicates a striking popularity of unstructured procedures in personnel selection, combined with a high confidence in one's own experience and intuition (Highhouse, 2008). One prominent example is the pronounced preference for the unstructured interview (Lievens & De Paepe, 2004; Stephan & Westhoff, 2002), even though research has shown that standardization leads to higher validity (Kepes, Banks, McDaniel, & Whetzel, 2012; McDaniel, Whetzel, Schmidt, & Maurer, 1994). The role of general mental ability in personnel selection, as another example, has been

emphasized for decades now (Schmidt & Hunter, 1998), but tests of cognitive ability are used only occasionally (e.g., companies surveyed by Ryan, McFarland, Baron, & Page, 1999, indicated the extend of use of cognitive ability tests with 21-50%, and only 30% of German companies use cognitive ability tests with at least some applicants, Schuler, Hell, Trapmann, Schaar, & Boramir, 2007). On the other hand, even methods like graphology, which have been found to be inappropriate in selection procedures (Driver, Buckley, & Frink, 1996), still find some supporters (Berchtold, 2005; Di Milia, Smith, & Brown, 1994; Ryan et al., 1999; Shackleton & Newell, 1994), although this is not as widespread as is sometimes believed (Bangerter, König, Blatti, & Salvisberg, 2009).

Another gap can be found when considering the use of personality tests in personnel selection. The Big Five personality dimensions are highly accepted among most researchers, and studies and discussions about the validity of personality measures very often focus on these five dimensions (e.g., Barrick, Mount, & Judge, 2001; Hurtz & Donovan, 2000; Morgeson et al., 2007; Ones, Dilchert, Viswesvaran, & Judge, 2007; Tett & Christiansen, 2007). However, personality testing consists of more than just the Big Five: Hogan (2005) reports that there are about 2,500 test publishers in the United States and Oakland (2004) believes that about 5,000 standardized tests are developed, sold and used in Western countries. These tests differ in content (e.g., traits, motivation, emotions), the extent of validity, type (e.g., psychometric vs. projective, dimension vs. type) and other effects (for an overview of some frequently used tests, their differences and characteristics, see Diekmann & König, in press). Many authors (e.g., Hogan, 2005; Hough & Oswald, 2005; Hülsheger & Maier, 2008; Johns, 1993; Klehe, 2004; Murphy & Dzieweczynski, 2005; Tewes, 1998) have argued that most of these personality tests do not measure the Big Five personality dimensions, and have not been constructed on scientifically based concepts or validated based on external performance criteria. In particular, the Myers-Briggs Type Indicator (MBTI), as one of the most famous and most widely used personality tests in the world, has

often been criticized and found to be inappropriate for applications in organizational settings (e.g., Murphy & Dzieweczynski, 2005; Pittenger, 2005).

As many personality tests are sold by commercial test publishers, which promote their tests on their websites, in flyers and in contacts with potential clients, there is likely more to a decision for or against a special personality test than "just" scientific quality criteria. This paper seeks to prove the effect of one possible promotion attribute: the link between personality and the brain, as implied by the HBDI. The HBDI is a US product that is used all over the world (Herrmann International, 2013) and that has been translated into 18 languages (Herrmann International Europe, 2011). According to the various local websites, it has been completed by one million people worldwide (e.g. Herrmann International Europe, 2011) and is used by up to 90% (e.g. Herrmann International UK, 2012) of the Fortune 100 companies. Although none of these websites recommend using the test in personnel selection, there is evidence that the HBDI is used in selection contexts (Berchtold, 2005).

The HBDI was constructed by personnel development specialist Ned Herrmann (1989) and is based on the idea of hemispheric specialization. It assigns people to four different types, which correspond to four brain quadrants made up of two dimensions (left hemisphere vs. right hemisphere and cerebral vs. limbic). Although historically speaking, it began with neuroscience findings, the test publisher now underlines the metaphorical link to the brain, which only serves as a model (Herrmann, 1989). Nevertheless, a link to the brain is pointed out (Herrmann, 1989). This special characteristic may well serve as an emotional selling proposition and therefore be a reason for the test's diffusiveness (cf. Barrena & Sánchez, 2009; Heath et al., 2006; Ries & Trout, 2001; Rossiter & Bellman, 2012).

The link between the brain and personality serves as an emotional selling proposition and people may be attracted to tests using this link. This can be demonstrated by the increasing influence of neuroscience information in the public domain and by studies concerning the effects neuroscience has on people. Neuroscience has gained a great deal of

influence in the past few years, both in scientific journals and among the general public (Canli & Amin, 2002; Illes, Kirschen, & Gabrieli, 2003; Poldrack, 2008; Racine et al., 2005; Rose, 2003; Roskies, 2008). Articles usually regard matters of neuroscience and the underlying techniques such as fMRI positively (Racine et al., 2005; Racine, Bar-Ilan, & Illes, 2006), even though neuroimages have to be interpreted and therefore proneness to error has to be considered (Farah & Wolpe, 2004; Klein, 2010; Kretschmann & Weinrich, 2007; Poldrack, 2006). Especially when it comes to localization hypotheses, a deep understanding of the technique is necessary to understand the results, but usually this is not transported through public media, which tends to simplify and sometimes even misinterpret results (Beck, 2010; Cacioppo et al., 2003; Farah, 2005; McCabe & Castel, 2008). Not surprisingly, laypersons often misunderstand findings or overestimate them (Dumit, 2004; Weisberg, 2008). Furthermore, not only are a huge number of such findings made public, they are also very convincing to layperson readers (Dumit, 2004; Poldrack, 2008). Weisberg, Keil, Goodstein, Rawson, and Gray (2007) were able to show that poor explanations of different psychological phenomena were rated as more satisfying when supported with (logically irrelevant) neuroscience information. McCabel and Castel (2008) found that agreement with the conclusions of studies concerning neuroscience was higher when there was a brain image than when no such image was provided. In line with other research showing that people sometimes use some kind of heuristics to evaluate explanations (e.g. Keil, 2006; Lombrozo, 2006; Trout, 2002), Weisberg et al.(2007) believe that neuroscience might be such a heuristic. Moreover, in public media, neuroscience information frequently serves as explanation of human behavior and may therefore be seen as explanatory information (Beck, 2010; Racine et al., 2005).

Given people's fascination with neuroscience research and information (as reflected in the high presence of such information in the popular press) and its "seductive allure" (Weisberg et al., 2007, p. 470), as reflected in higher ratings of information with than

without neuroscience explanations or images, personality tests that refer to neuroscience information should be more compelling than tests without. More formally, we hypothesize:

H1: A test that refers to neuroscience information will be evaluated as more attractive than the same test without such information.

Weisberg et al. (2007) found different effects for laypersons and experts of neuroscience: Laypersons rated poor explanations with neuroscience information as more satisfying, whereas no such main effect was found for experts of neuroscience. This finding leads to the question of whether different samples react differently to neuroscience information. In contrast to Weisberg et al. (2007), we are interested not only in differential effects of neuroscience expertise, but also in possible effects of HR and personality expertise, because this kind of expertise might have an impact on decisions in practice. Therefore, we acquired three samples: first, a sample of HR experts with extensive knowledge about personnel selection; second, a sample of business management students with basic knowledge about personnel selection but probably no experience in neuroscience; and third, a sample of psychology students who should have basic knowledge in both areas.

The view of HR practitioners is considered as the most important when addressing such an issue as the research-practice gap. HR experts – at least in Germany – very often have a business management education but are seldom trained in psychology (Deller, Süßmair, Albrecht, & Bruchmüller, 2005; Haufe eCampus Redaktion, 2012; for evidence in other countries see, e.g., Hoque & Noon, 2001; König, Klehe, Berchtold, & Kleinmann, 2010), so they probably know little about neuroscience. At the same time, they are very likely to be in contact with consultants and test publishers, meaning that they may be accustomed to extensive promotion messages. We therefore expect a moderate effect of neuroscience information in HR practitioners. The business management students, with only basic knowledge about personnel selection and no knowledge of neuroscience, should show a stronger effect as they have no experience with personality tests or the advertisement of

personality tests. Psychology students, in contrast, have basic knowledge in personnel selection as well as personality theory and neuroscience. Moreover, they should be trained in the critical evaluation of neuroscience findings. We therefore expect only a small or even negative effect of neuroscience information in this group. Accordingly, we hypothesize:

H2: The positive effect of neuroscience information on the judgment of personality tests should be strong for business management students, moderate for HR experts and small for psychology students.

Method

Participants

HR experts. Participants were personnel managers in the German financial industry. They all were employed by so called “Sparkassen” – public banks that work as independent and decentralized institutions under local management with own personnel staff but that all belong to the same umbrella organization with 422 sites across Germany (as of June 2013). They were contacted by email and sent an invitation to an online survey operated via Unipark (QuestBack GmbH). No compensation was offered. A total of 109 HR experts (52.3% male, 34.9% female, 12.8% did not specify their sex) participated in this experiment. Almost half of them (44%) had completed an academic education, mostly having studied business management (50%), education with a focus on business studies (22.9) or psychology (12.5%). They had been working in the field of HR for an average of 14.5 years (SD = 9.7); 83.5% were involved in personnel selection procedures and 70.6% in decisions about which selection procedures are used. Personality tests were already used by 24.8% of the respondents. Once they had started the survey, participants were welcomed and were given some information about informed consent conditions. They were asked to think of a situation in which they wanted to supplement their selection procedure with a personality

test and were randomly assigned to the with (n = 64) or without (n = 45) neuroscience condition, which differed in the subsequent material presented.

Business management students. Potential participants were contacted by email distribution lists with business management students of different German universities. All participants had the chance to win one of five 10€ Amazon gift cards. Of the initial sample, only those studying business management or similar were included in the analysis. A total of 108 participants (35.2% male, 61.1% female, 3.7% did not specify their sex) remained, the majority of whom were still studying in a bachelor degree program (70.4%). Some participants (47.2%) already had some practical experience with personnel selection (for example during an internship), but only 9.3% had experience with personality tests. In this group, basic knowledge concerning selection procedures as well as sufficient inexperience with personality tests can be assumed. Again, participants were randomly assigned to the with (n = 50) and without (n = 58) neuroscience condition.

Psychology students. Participants were recruited from an introductory class of Industrial and Organizational Psychology (which also covered a basic introduction to personnel selection) at a German university in the middle of a semester. No incentive or compensation was provided. According to the module manual, these second-year students were supposed to have an introductory class of clinical neuroscience in the same semester and to have completed two classes of biopsychology (covering the neuroscience side of psychology) in the previous year and should therefore have some first impressions about personnel selection as well as neuroscience. Participants were randomly assigned to the with (n = 54) and without (n = 47) neuroscience condition. After all of the students who were not studying psychology had been excluded, 101 participants (21.8% male, 77.2% female, 1.0% did not specify their sex) remained and were included in analysis. Some participants (19.8%) already had practical experience with personnel selection (for example during an internship), but only 6.9% had experience with personality tests.

Overall sample. In total, 318 people (36.8% male, 57.2% female, 6.0% did not specify their sex) participated, 168 of whom completed the with neuroscience condition and 150 the without neuroscience condition.

Material

To avoided bias concerning a real test publisher that might be known by participants (especially the HR experts) and to avoid copyright problems, we created material that refers to a fictitious personality test. Based on websites and flyers for different personality tests (e.g., HBDI, Thomas International, and MBTI), a flyer for a personality test called Personality at Work Inventory (P-WIN) was created. This flyer explained the benefits of capturing personality in personnel selection, described twelve factors or dimensions which the test was supposed to measure as well as some details on application and reporting. We developed two versions of this flyer, which differed in their reference to neuroscience. The first version had no relation to neuroscience, stating that the test was developed in cooperation with scientists based on new scientific findings and showing a picture of three figures climbing ladders. The second version stated that the test was developed in cooperation with scientists based on new neuroscience findings and that personality traits can be detected through the activation of different brain areas. This version was illustrated by an fMRI image (see Figure 1).

Dependent variables

Participants were asked to evaluate the described personality tests on six items using a seven-point rating scale (strongly disagree to strongly agree) referring to adequacy (item 1) and objectiveness (item 2) of the test in selection contexts, content (item 3) and design (item 4) of the flyer, interest in additional information on the test (item 5) and overall liking (item 6). Beyond this, participants were able to comment on what had affected their ratings using an open-format item. The six items showed a good reliability (Cronbach's $\alpha = .87$, which was comparable over all three subsamples: HR experts $\alpha = .89$; business management

students $\alpha = .89$; psychology students $\alpha = .83$) and were therefore combined to form a scale serving as a measure of overall test rating.

Results

Means and standard deviations of all groups can be found in Table 1. Please note that Levene's test for equality of variances indicated that the variability of each group was approximately equal, $F(5,312) = 1.49$. Furthermore, the effects are visualized in Figure 2.

To find out whether the addition of neuroscience information to the flyer of a personality test has any effect on the assessment of the fictitious P-WIN test (H1), we analyzed the ratings using a 2 (with vs. without neuroscience) × 3 (HR experts vs. business management students vs. psychology students) analysis of variance (ANOVA). There was a significant main effect of flyer version, $F(1,312) = 5.94$, $p < 0.05$, indicating that neuroscience information has an impact on ratings. Contrary to our expectations, the flyer with information (overall $M = 4.05$, $SD = 1.11$) was rated more negatively than the flyer without neuroscience information (overall $M = 4.39$, $SD = 1.15$); thus, our hypothesis was not confirmed, and was instead disproved (see Figure 2, Table 1). There was no main effect of subgroups, $F(2,312) = 2.25$, $p = .11$, indicating that ratings between the three subgroups were equal. There was no interaction between flyer version and subgroups, $F(2,312) = 0.97$, $p = .38$.

Although the effect was contrary to H1, we can still analyze whether there are differences between groups concerning the size of effect (H2). The descriptive statistics (see Table 1) and a visual inspection of results (see Figure 2) indicate that the (negative) effect of neuroscience information was greatest for HR experts, moderate for business management students and small for psychology students. We tested this adapted H2 with linear contrasts, and it showed a significant difference, $t(315) = 2.01$, $p < .05$, indicating that neuroscience information had differential effects on subsamples.

Discussion

The research-practice gap in personnel selection has often been mentioned (e.g., Anderson et al., 2004; Klehe, 2004; Terpstra & Rozell, 1997), and many authors (e.g., Hough & Oswald, 2000; Murphy & Dzieweczynski, 2005) have lamented in particular why personality tests used in personnel selection practice quite often do not meet scientific criteria. The present study was designed to investigate whether a personality test using neuroscience information in its promotional flyer is more attractive than the same test without such information. Contrary to expectations, we found that neuroscience information served as a negative cue: Test flyers with this information received lower ratings than test flyers without this information. An additional contrast analysis revealed that HR experts were most negatively impacted by neuroscience information, whereas psychology students were hardly affected.

These findings reveal some good and some bad news. The bad news is that our results show how easily decision processes regarding selection tools can be influenced. Our manipulation was quite small, differing only in a picture and two sentences at one point in the flyer – nevertheless, it affected HR experts and, to a lesser extent, business management students. This is alarming as it shows (once more) that quality criteria and the fitting of dimensions to requirements are not the only aspects which play a role in the decision for a personality test (cf. König et al., 2010). Moreover, it may be possible that such small differences in promotion might be even more influential than differences in quality criteria if such a small manipulation works. As commercial test publishers probably invest a lot more time and money in the development of a beneficial promotion strategy than scientists, our findings can contribute to the question of the research-practice gap and why some personality tests used in practice are not what we expect them to be.

The good news is that particularly HR experts did not fall into the trap and not only resisted but even contradicted the assumed seductive allure of neuroscience. This is good

news at least for the field of personnel selection, since it suggests that HR practitioners cannot be easily entrapped with some nice brain scan pictures and the like, in marked contrast to the perception that a huge amount of public literature typically reports positively about neuroscience findings (e.g., Pillay, 2011; Racine et al., 2005; Racine, Waldman, Rosenberg, & Illes, 2010; Weisberg, 2008). One reason for our finding might be that HR experts are frequently exposed to personality test promotion in the form of information flyers or via telephone calls from commercial test providers. Therefore, they could be sensitized to emotional selling propositions of this kind and react critically if they judge certain statements as questionable. Another or additional reason could be that the huge amount of articles about neuroscience findings in the popular press has the same effect: People might have become more reticent regarding the issue, possibly because the technique is no longer new and exciting, and therefore results are seen more impartially.

Although HR experts and, at least in part, business management students reacted negatively towards using a neuroimage for promotional purposes, psychology students were not particularly critical towards the manipulation (despite knowledge about neuroscience). It seems that the impact of neuroscience information is not a general one but depends on one's training and employment background. Our results also suggest that training in the field of neuroscience does not lead to a critical attitude towards this subject. Weisberg et al. (2007) even found that their students (recruited from a neuroscience course) rated explanations with neuroscience information even more positively than explanations without. Thus, training in neuroscience and its limitations seems to lead to a favorable attitude towards the technique of fMRI, at least as long as people are not neuroscience experts (Weisberg et al., 2007). Therefore, the question arises of whether we educate our students appropriately. Our passion for our subject, regardless of whether it is neuroscience or personnel selection, probably affects our way of teaching. An advocate of personality tests in personnel selection may communicate a different view to his or her students than an opponent. A researcher in

neuroscience may impart a positive attitude of his subject to his or her students. Perhaps we sometimes need to take a step aside and reconsider the content of our classes and the way in which we impart our knowledge.

At the same time, our results also question the general "seductive allure of neuroscience explanations" (Weisberg et al., 2007, p. 470) and imply that findings from the general literature about the effects of neuroscience information (Weisberg et al., 2007) have to be reconsidered accordingly. In fact, our study is in contrast with Weisberg et al. (2007) and more consistent with very recent research that found no effects of neuroimages (e.g., Hook & Farah, 2013; Schweitzer, Baker, & Risko, 2013). The differential results of our study suggest that experience and training background play an important role in the decision process, at least concerning the influence of neuroscience information as part of the promotion strategy. This is in sharp contrast to Weisberg et al. (2007), who found *positive* effects of neuroscience information on poor explanations for neuroscience particularly for laypersons (like HR experts).

More generally, this study suggests that it is beneficial to search for tailored solutions to specific facets of the research-practice gap. This gap concerns many different aspects of HR instruments, with personnel selection and personality tests being one part of it. Although many general solutions have already been suggested, in particular on how to conduct scientific research or how to communicate scientific findings to practitioners (e.g., Buckley, Ferris, Bernardin, & Harvey, 1998; Gelade, 2006; Huff, 2000; Van de Ven & Johnson, 2006), facets of the research-practice gap seem to be better understood if an additional, more focused perspective is additionally chosen, such as a close look at how tests are promoted.

As always, our study is not free from limitations. First, it should be mentioned that the setting was a simulation, as participants were not in a real situation of a decision process resulting in the choice for a personality test. However, to test our causal hypotheses, we needed an experimental design, and convincing test publishers to manipulate their promotion

material was deemed impossible. Furthermore, personality tests are not used that often (e.g., Diekmann & König, in press; Schuler et al., 2007), making the decision for or against a test a rare event. Therefore, the disadvantage of the use of a hypothetical scenario must be considered together with the advantage of being able to draw causal conclusions. Moreover, there is a high correlation of laboratory and field effects in Industrial and Organizational psychology (Mitchell, 2012), suggesting that lab studies generally generalize fairly well to the field.

Second, a decision process is likely more complex than in our simulation. We did not simulate a complete decision process in which different alternatives are likely compared and in which more variables – individual as well as organizational and situational factors – come into play. Previous research has already shown that aspects such as validity, anticipated applicant reactions, and costs are generally important for decision makers (König et al., 2010), and there might be even more aspects (see Diekmann & König, in press), because decision making research shows that rationality in decision making is bounded (Simon, 1972, 2000) and heuristics are used (Tversky & Kahneman, 1974). The impact of these features in general and especially in combination with differences in validity aspects has yet to be explored. Such exploration could be achieved using both experimental and correlational designs, with the former offering causal explanations in a controlled setting and the latter offering the inclusion of other potential variables such as the general attitude toward personality tests.

Third, we conducted our study with German participants. In the past, a greater reservation concerning personality testing in Germany than in other countries has been mentioned (Schuler, Frier, & Kauffmann, 1993), and nothing is known about the coverage of neuroscience information in public media in Germany in comparison to other countries. Therefore, replication in other countries seems necessary.

Future research should also explore the (perhaps not so) seductive allure of neuroscience in subfields of Industrial and Organizational Psychology other than selection. For example, neuroscience approaches have been used to study leadership (for a critical review of this, see Lindebaum & Zundel, 2013). Although our data showed a negative reaction of HR experts to neuroscience information, it remains to be tested how HR practitioners react to neuroscience explanations regarding leadership issues.

This study has important implications for commercial test publishers and for other institutions selling scientifically constructed tests. On the one hand, our research shows – in line with others (see Fitzsimons et al., 2002) – that some non-conscious aspects like certain promotion features have an impact on potential customers. On the other hand, relatively cheap tricks to sell a test (e.g., adding a brain scan) will likely not do the job, as HR experts will react negatively.

To conclude, the research-practice gap concerning the use of personality tests in personnel selection has often been mentioned (e.g., Murphy & Dzieweczynski, 2005). To our knowledge, only few authors have dealt with the question of which personality tests are actually used (see Diekmann & König, in press, for an overview) and why. We showed that using neuroscience information is likely a bad idea for promoting a personality test, and we hope that more research will explore other aspects that are also important in the decision process of choosing a personality test for selection purposes.

References

Abrahamson, E., & Eisenman, M. (2001). Why management scholars must intervene strategically in the management knowledge market. *Human Relations, 54,* 67–75. doi:10.1177/0018726701541009

Anderson, N., Herriot, P., & Hodgkinson, G. P. (2001). The practitioner-researcher divide in Industrial, Work and Organizational (IWO) psychology: Where are we now, and where do we go from here? *Journal of Occupational and Organizational Psychology, 74,* 391–412. doi:10.1348/096317901167451

Anderson, N., Lievens, F., van Dam, K., & Ryan, A. M. (2004). Future perspectives on employee selection: Key directions for future research and practice. *Applied Psychology: An International Review, 53,* 487–501. doi:10.1111/j.1464-0597.2004.00183.x

Bangerter, A., König, C. J., Blatti, S., & Salvisberg, A. (2009). How widespread is graphology in personnel selection practice? A case study of a job market myth. *International Journal of Selection and Assessment, 17,* 219–230. doi:10.1111/j.1468-2389.2009.00464.x

Barrena, R., & Sánchez, M. (2009). Using emotional benefits as a differentiation strategy in saturated markets. *Psychology and Marketing, 26,* 1002–1030. doi:10.1002/mar.20310

Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and performance at the beginning of the new millennium: What do we know and where do we go next? *International Journal of Selection and Assessment, 9,* 9–30. doi:10.1111/1468-2389.00160

Beck, D. M. (2010). The appeal of the brain in the popular press. *Perspectives on Psychological Science, 5,* 762–766. doi:10.1177/1745691610388779

Berchtold, M. (2005). Häufigste Auswahlverfahren in der Personalselektion [Most frequently used selection methods in personnel selection]. *HR Today*, *12/2005*, 37–39.

Buckley, M. R., Ferris, G. R., Bernardin, H. J., & Harvey, M. G. (1998). The disconnect between the science and practice of management. *Business Horizons, 41*, 31–38. doi:16/S0007-6813(98)90032-5

Cacioppo, J. T., Berntson, G. G., Lorig, T. S., Norris, C. J., Rickett, E., & Nusbaum, H. (2003). Just because you're imaging the brain doesn't mean you can stop using your head: A primer and set of first principles. *Journal of Personality and Social Psychology*, *85*, 650–661. doi:10.1037/0022-3514.85.4.650

Canli, T., & Amin, Z. (2002). Neuroimaging of emotion and personality: Scientific evidence and ethical considerations. *Brain and Cognition, 50*, 414–431. doi:10.1016/S0278-2626(02)00517-1

Deller, J., Süßmair, A., Albrecht, A.-G., & Bruchmüller, S. (2005). Akademische Ausbildung von Fachkräften für das Personalmanagement: Der HR-Manager als strategischer Partner [Perspectives of Academic Education of HR Specialists]. *Personalführung*, *38*, 52–59.

DeYoung, C. G., Hirsh, J. B., Shane, M. S., Papademetris, X., Rajeevan, N., & Gray, J. R. (2010). Testing predictions from personality neuroscience: Brain structure and the Big Five. *Psychological Science, 21*, 820–828. doi:10.1177/0956797610370159

Di Milia, L., Smith, P. A., & Brown, D. F. (1994). Management selection in Australia: A comparison with British and French findings. *International Journal of Selection and Assessment, 2*, 80–90. doi:10.1111/j.1468-2389.1994.tb00152.x

Diekmann, J., & König, C. J. (in press). Personality testing in personnel selection: Love it? Leave it? Change it! In I. Nikolaou & J. K. Oostrom (Eds.), *Employee recruitment,*

selection, and assessment. Contemporary issues for theory and practice. Psychology Press: Taylor & Francis.

Driver, R. W., Buckley, M. R., & Frink, D. D. (1996). Should we write off graphology? *International Journal of Selection and Assessment, 4*, 78–86. doi:10.1111/j.1468-2389.1996.tb00062.x

Dumit, J. (2004). *Picturing personhood: Brain scans and biomedical identity*. Princeton, NJ: Princeton University Press.

Farah, M. J. (2005). Neuroethics: The practical and the philosophical. *Trends in Cognitive Sciences, 9*, 34–40. doi:10.1016/j.tics.2004.12.001

Farah, M. J., & Wolpe, P. R. (2004). Monitoring and manipulating brain function: New neuroscience technologies and their ethical implications. *Hastings Center Report, 34*, 35–45. doi:10.2307/3528418

Fitzsimons, G. J., Hutchinson, J. W., Williams, P., Alba, J. W., Chartrand, T. L., Huber, J., … Tavassoli, N. T. (2002). Non-conscious influences on consumer choice. *Marketing Letters, 13*, 269–279. doi:10.1023/A:1020313710388

Gelade, G. A. (2006). But what does it mean in practice? The Journal of Occupational and Organizational Psychology from a practitioner perspective. *Journal of Occupational and Organizational Psychology, 79*, 153–160. doi:10.1348/096317905X85638

Haufe eCampus Redaktion. (2012, January 10). Berufswunsch: Personaler – Einstiegswege. *Haufe eCampus*. Retrieved May 24, 2013, from http://ecampus.haufe.de/karriere/berufswunsch-personaler-einstiegswege/

Heath, R., Brandt, D., & Nairn, A. (2006). Brand relationships: Strengthened by emotion, weakened by attention. *Journal of Advertising Research, 46*, 410–419.

Herrmann International. (2013). Herrmann International. Retrieved May 2, 2013, from http://www.herrmanninternational.com/home/index.php

Herrmann International Europe. (2011). Herrmann International dans le monde. Retrieved May 2, 2013, from http://www.herrmann-europe.com/fr/qui.php

Herrmann International UK. (2012). Clients. Retrieved May 2, 2013, from http://www.hbdi.co.uk/why_us/clients.html

Herrmann, N. (1989). *The creative brain*. Lake Lure, NC: Brain Books.

Highhouse, S. (2008). Stubborn reliance on intuition and subjectivity in employee selection. *Industrial and Organizational Psychology, 1*, 333–342. doi:10.1111/j.1754-9434.2008.00058.x

Hodgkinson, G. P., Herriot, P., & Anderson, N. (2001). Re-aligning the stakeholders in management research: Lessons from Industrial, Work and Organizational Psychology. *British Journal of Management, 12*, 41–48. doi:10.1111/1467-8551.12.s1.5

Hogan, R. (2005). In defense of personality measurement: New wine for old whiners. *Human Performance, 18*, 331–341. doi:10.1207/s15327043hup1804_1

Hook, C. J., & Farah, M. J. (2013). Look again: Effects of brain images and mind - Brain dualism on lay evaluations of research. *Journal of Cognitive Neuroscience, 25*, 1397–1405. doi:10.1162/jocn_a_00407

Hoque, K., & Noon, M. (2001). Counting angels: A comparison of personnel and HR specialists. *Human Resource Management Journal, 11*, 5–22. doi:10.1111/j.1748-8583.2001.tb00042.x

Hough, L. M., & Oswald, F. L. (2000). Personnel selection: Looking toward the future - remembering the past. *Annual Review of Psychology, 51*, 631–664. doi:10.1146/annurev.psych.51.1.631

Hough, L. M., & Oswald, F. L. (2005). They're right, well ... mostly right: Research evidence and an agenda to rescue personality testing from 1960s insights. *Human Performance, 18*, 373–387. doi:10.1207/s15327043hup1804_4

Huff, A. S. (2000). 1999 Presidential Address: Changes in organizational knowledge production. *Academy of Management Review*, *25*, 288–293. doi:10.5465/AMR.2000.3312916

Hülsheger, U. R., & Maier, G. W. (2008). Persönlichkeitseigenschaften, Intelligenz und Erfolg im Beruf: Eine Bestandsaufnahme internationaler und nationaler Forschung. [Personality traits, intelligence, and success at work: A review of international and national research]. *Psychologische Rundschau, 59*, 108–122. doi:10.1026/0033-3042.59.2.108

Hurtz, G. M., & Donovan, J. J. (2000). Personality and job performance: The Big Five revisited. *Journal of Applied Psychology*, *85*, 869–879. doi:10.1037/0021-9010.85.6.869

Illes, J., Kirschen, M. P., & Gabrieli, J. D. E. (2003). From neuroimaging to neuroethics. *Nature Neuroscience*, *6*, 205. doi:10.1038/nn0303-205

Johns, G. (1993). Constraints on the adoption of psychology-based personnel practices: Lessons from organizational innovation. *Personnel Psychology*, *46*, 569–592. doi:10.1111/j.1744-6570.1993.tb00885.x

Keil, F. C. (2006). Explanation and understanding. *Annual Review of Psychology*, *57*, 227–254. doi:10.1146/annurev.psych.57.102904.190100

Kepes, S., Banks, G. C., McDaniel, M., & Whetzel, D. L. (2012). Publication bias in the organizational sciences. *Organizational Research Methods*, *15*, 624–662. doi:10.1177/1094428112452760

Klehe, U.-C. (2004). Choosing how to choose: Institutional pressures affecting the adoption of personnel selection procedures. *International Journal of Selection and Assessment*, *12*, 327–342. doi:10.1111/j.0965-075X.2004.00288.x

Klein, C. (2010). Images are not the evidence in neuroimaging. *The British Journal for the Philosophy of Science*, *61*, 265–278. doi:10.1093/bjps/axp035

König, C. J., Klehe, U., Berchtold, M., & Kleinmann, M. (2010). Reasons for being selective when choosing personnel selection procedures. *International Journal of Selection and Assessment, 18,* 17–27. doi:10.1111/j.1468-2389.2010.00485.x

Kretschmann, H.-J., & Weinrich, W. (2007). *Klinische Neuroanatomie und kranielle Bilddiagnostik: Atlas der Magnetresonanztomographie und Computertomographie [Clinical neuroanatomy and cranial imaging diagnosis: Atlas of magnet resonance imaging and computed tomography]* (3rd ed.). Stuttgart, Germany: Thieme.

Lievens, F., & De Paepe, A. (2004). An empirical investigation of interviewer-related factors that discourage the use of high structure interviews. *Journal of Organizational Behavior, 25,* 29–46. doi:10.1002/job.246

Lindebaum, D., & Zundel, M. (2013). Not quite a revolution: Scrutinizing organizational neuroscience in leadership studies. *Human Relations, 66,* 857–877. doi:10.1177/0018726713482151

Lombrozo, T. (2006). The structure and function of explanations. *Trends in Cognitive Sciences, 10,* 464–470. doi:16/j.tics.2006.08.004

McCabe, D. P., & Castel, A. D. (2008). Seeing is believing: The effect of brain images on judgments of scientific reasoning. *Cognition, 107,* 343–352. doi:10.1016/j.cognition.2007.07.017

McDaniel, M. A., Whetzel, D. L., Schmidt, F. L., & Maurer, S. D. (1994). The validity of employment interviews: A comprehensive review and meta-analysis. *Journal of Applied Psychology, 79,* 599–616. doi:10.1037/0021-9010.79.4.599

Mitchell, G. (2012). Revisiting truth or triviality: The external validity of research in the psychological laboratory. *Perspectives on Psychological Science, 7,* 109–117. doi:10.1177/1745691611432343

Morgeson, F. P., Campion, M. A., Dipboye, R. L., Hollenbeck, J. R., Murphy, K., & Schmitt, N. (2007). Are we getting fooled again? Coming to terms with limitations in

the use of personality tests for personnel selection. *Personnel Psychology*, *60*, 1029–1049. doi:10.1111/j.1744-6570.2007.00100.x

Murphy, K. R., & Dzieweczynski, J. L. (2005). Why don't measures of broad dimensions of personality perform better as predictors of job performance? *Human Performance*, *18*, 343–357. doi:10.1207/s15327043hup1804_2

Oakland, T. (2004). Use of educational and psychological tests internationally. *Applied Psychology*, *53*, 157–172. doi:10.1111/j.1464-0597.2004.00166.x

Ones, D. S., Dilchert, S., Viswesvaran, C., & Judge, T. A. (2007). In support of personality assessment in organizational settings. *Personnel Psychology*, *60*, 995–1027. doi:10.1111/j.1744-6570.2007.00099.x

Pillay, S. S. (2011). *Your brain and business: The neuroscience of great leaders*. Upper Saddle River, NJ: Pearson Education, FT Press.

Pittenger, D. J. (2005). Cautionary comments regarding the Myers-Briggs Type Indicator. *Consulting Psychology Journal: Practice and Research*, *57*, 210–221. doi:10.1037/1065-9293.57.3.210

Poldrack, R. A. (2006). Can cognitive processes be inferred from neuroimaging data? *Trends in Cognitive Sciences*, *10*, 59–63. doi:10.1016/j.tics.2005.12.004

Poldrack, R. A. (2008). The role of fMRI in cognitive neuroscience: Where do we stand? *Current Opinion in Neurobiology*, *18*, 223–227. doi:10.1016/j.conb.2008.07.006

Racine, E., Bar-Ilan, O., & Illes, J. (2005). Science and society: fMRI in the public eye. *Nature Reviews Neuroscience*, *6*, 159–164. doi:10.1038/nrn1609

Racine, E., Bar-Ilan, O., & Illes, J. (2006). Brain imaging: A decade of coverage in the print media. *Science Communication*, *28*, 122–143. doi:10.1177/1075547006291990

Racine, E., Waldman, S., Rosenberg, J., & Illes, J. (2010). Contemporary neuroscience in the media. *Social Science & Medicine*, *71*, 725–733. doi:10.1016/j.socscimed.2010.05.017

Ries, A., & Trout, J. (2001). *Positioning: The battle for your mind*. New York: McGraw-Hill.

Rose, S. P. R. (2003). How to (or not to) communicate science. *Biochemical Society Transactions, 31,* 307–312. doi:10.1042/BST0310307

Roskies, A. L. (2008). Neuroimaging and inferential distance. *Neuroethics, 1,* 19–30. doi:10.1007/s12152-007-9003-3

Rossiter, J., & Bellman, S. (2012). Emotional branding pays off: How brands meet share of requirements through bonding, companionship, and love. *Journal of Advertising Research, 52*, 291–296. doi:10.2501/JAR-52-3-291-296

Rowe, P. M., Williams, M. C., & Day, A. L. (1994). Selection procedures in North America. *International Journal of Selection and Assessment, 2,* 74–79. doi:10.1111/j.1468-2389.1994.tb00153.x

Ryan, A. M., McFarland, L., Baron, H., & Page, R. (1999). An international look at selection practices: Nation and culture as explanations for variability in practice. *Personnel Psychology, 52*, 359–391. doi:10.1111/j.1744-6570.1999.tb00165.x

Rynes, S. L., Colbert, A. E., & Brown, K. G. (2002). HR Professionals' beliefs about effective human resource practices: Correspondence between research and practice. *Human Resource Management, 41*, 149–174. doi:10.1002/hrm.10029

Rynes, S. L., Giluk, T. L., & Brown, K. G. (2007). The very separate worlds of academic and practitioner periodicals in human resource management: Implications for evidence-based management. *Academy of Management Journal, 50,* 987–1008. doi:10.5465/AMJ.2007.27151939

Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin, 124*, 262–274. doi:10.1037/0033-2909.124.2.262

Schuler, H., Frier, D., & Kauffmann, M. (1993). *Personalauswahl im europäischen Vergleich [Personnel selection in a European comparison]*. Göttingen, Germany: Verlag für Angewandte Psychologie.

Schuler, H., Hell, B., Trapmann, S., Schaar, H., & Boramir, I. (2007). Die Nutzung psychologischer Verfahren der externen Personalauswahl in deutschen Unternehmen: Ein Vergleich über 20 Jahre [Use of personnel selection instruments in German organizations during the last 20 years]. *Zeitschrift für Personalpsychologie, 6*, 60–70. doi:10.1026/1617-6391.6.2.60

Schweitzer, N. J., Baker, D. A., & Risko, E. F. (2013). Fooled by the brain: Re-examining the influence of neuroimages. *Cognition, 129*, 501–511. doi:10.1016/j.cognition.2013.08.009

Shackleton, V., & Newell, S. (1994). European management selection methods: A comparison of five countries. *International Journal of Selection and Assessment, 2*, 91–102. doi:10.1111/j.1468-2389.1994.tb00155.x

Shapiro, D. L., Kirkman, B. L., & Courtney, H. G. (2007). Perceived causes and solutions of the translation problem in management research. *Academy of Management Journal, 50*, 249–266. doi:10.5465/AMJ.2007.24634433

Simon, H. A. (1972). Theories of bounded rationality. In C. McGuire & R. Radner (Eds.), *Decision and organization* (pp. 161–176). Amsterdam: North-Holland.

Simon, H. A. (2000). Bounded rationality in social science: Today and tomorrow. *Mind & Society, 1*, 25–39. doi:10.1007/BF02512227

Stephan, U., & Westhoff, K. (2002). Personalauswahlgespräche im Führungskräftebereich des deutschen Mittelstandes: Bestandsaufnahme und Einsparungspotenzial durch strukturierte Gespräche [Personnel selection interviews in the management sector of German medium-sized business organizations: Current situation and potential improvements through structured interviews]. *Wirtschaftspsychologie, 4*, 3–17.

Terpstra, D. E. (1996). The search for effective methods. *HR Focus*, *73*, 16.

Terpstra, D. E., & Rozell, E. J. (1993). The relationship of staffing practices to organizational level measures of performance. *Personnel Psychology*, *46*, 27–48. doi:10.1111/j.1744-6570.1993.tb00866.x

Terpstra, D. E., & Rozell, E. J. (1997). Why some potentially effective staffing practices are seldom used. *Public Personnel Management*, *26*, 483. doi:10.1177/009102609702600405

Tett, R. P., & Christiansen, N. D. (2007). Personality tests at the crossroads: A response to Morgeson, Campion, Dipboye, Hollenbeck, Murphy, and Schmitt (2007). *Personnel Psychology*, *60*, 967–993. doi:10.1111/j.1744-6570.2007.00098.x

Tewes, U. (1998). Qualitätsmanagement in der psychologischen Diagnostik [Quality management in psychological diagnostics]. *Zeitschrift für Medizinische Psychologie*, *7*, 114–120.

Trout, J. D. (2002). Scientific explanation and the sense of understanding. *Philosophy of Science*, *69*, 212–233. doi:10.1086/341050

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*, 1124 –1131. doi:10.1126/science.185.4157.1124

Van de Ven, A. H., & Johnson, P. E. (2006). Knowledge for theory and practice. *Academy of Management Review*, *31*, 802–821. doi:10.5465/AMR.2006.22527385

Weisberg, D. S. (2008). Caveat lector: The presentation of neuroscience information in the popular media. *Scientific Review of Mental Health Practice*, *6*, 51–56.

Weisberg, D. S., Keil, F. C., Goodstein, J., Rawson, E., & Gray, J. R. (2007). The seductive allure of neuroscience explanations. *Journal of Cognitive Neuroscience*, *20*, 470–477. doi:10.1162/jocn.2008.20040

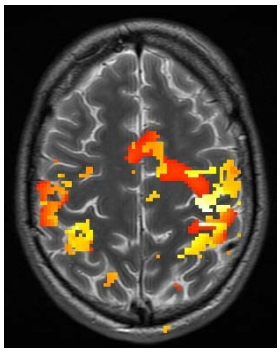

Figure 1. fMRI image used to illustrate the test version with neuroscience information. From "Brain activation for the movement of fingers measured in an fMRI experiment" by K. Tabelow, 2009, http://www.mathematik.hu-berlin.de/~tdm/2009/abstract.php?name=tabelow&id=uf5pYyDxgBv5I. Copyright 2009 by Karsten Tabelow. Reprinted with permission.

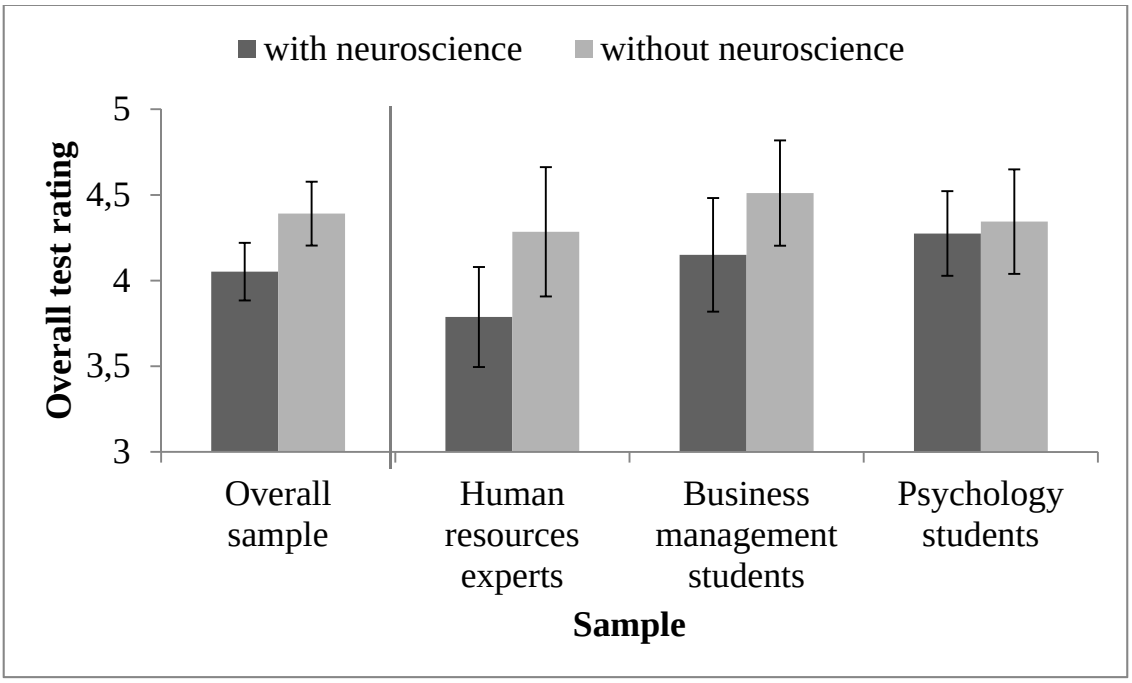

Figure 2. Overall test rating separately for sample and subsamples. Error bars indicate 95% confidence interval.

Table 1

Overall test rating, standard deviations and effects size for sample and subsamples.

Sample	Test version	*n*	*M*	*SD*	*d*
Overall	with	168	4.05	1.11	-0.29
	without	150	4.39	1.15	
HR experts	with	64	3.79	1.17	-0.41
	without	45	4.28	1.25	
Business management students	with	50	4.15	1.67	-0.31
	without	58	4.51	1.17	
Psychology students	with	54	4.27	0.91	-0.07
	without	47	4.34	1.04	