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ABSTRACT

Biology, during the last decade in particular, is making substantial headway into our social theories of business and behavior. While the social sciences rush to keep up with the advancement of knowledge, we highlight the need for an ethics discussion to also keep pace. While the implications to theory are important, our focus is on how new knowledge has the capacity to alter the formulation and practice of business policy, which we believe is potentially profound (Goodenough & Tucker, 2010; Rothenburg & Wang, 2006). Furthermore, the ethicality of a set of issues can depend heavily on one's perspective, and differing views may not always be compatible. With this in mind, we discuss the ways in which one area of emerging biological knowledge – behavioral genetics – invites a rethinking of the nuances of four longstanding topic areas of business ethics surrounding personnel selection; and we do so from two perspectives – that of the employer and of the job seeker. The four ethical topics are (1) the static (mostly) nature of genetic information that is out of an individual's control, (2) faking and lying during selection processes, (3) privacy, and (4) stigmatization of minority groups.

keywords: ethics, personnel selection, behavioral genetics

INTRODUCTION

Biology, during the last decade in particular, is making substantial headway into our social theories of business and behavior (e.g. Ilies, Arvey, & Bouchard, 2006). While the social sciences rush to keep up with the advancement of knowledge, we highlight the need for an ethics discussion to also keep pace and even precede oncoming advances. While the implications to our theories and frameworks are important, our focus is on how new knowledge has the capacity to alter the formulation and practice of business policy, which we believe is potentially profound (Goodenough & Tucker, 2010; Rothenburg & Wang, 2006). Furthermore, the ethicality of a set of issues can depend heavily on one's perspective, and differing views may not always be compatible. With this in mind, we discuss the ways in which one area of emerging biological knowledge – behavioral genetics – invites a rethinking of the nuances of four longstanding topic areas of business ethics surrounding personnel selection; and we do so from two perspectives – that of the employer and of the job seeker.

Behavioral geneticists have determined that the traits, attitudes, and behaviors that social scientists have identified as most critical to personnel selection are significantly influenced by our DNA (e.g. Bouchard, 2009; Ilies & Judge, 2003). For example, studies of biological twins show that virtually all human attributes and behavioral traits are to some degree significantly influenced by genetics (Johnson, Turkheimer, Gottesman, & Bouchard, 2009). Furthermore, researchers are identifying the actual locations on human chromosomes that contribute to that influence (e.g. Cloninger, Eerdewegh, Goate, Edenberg, Blangero, Hesselbrock, & Reich, 1998; Fullerton, Cubin, Tiwari, Wang, Bomhra, Davidson, & Flint, 2003). Beyond this, and of critical importance to an ethics discussion, we are also understanding more clearly that genes and

environment are intricately intertwined and constantly interact to jointly influence human behavior (Johnson, 2007; McGuffin, et al., 2001).

This knowledge that genes and environment interact, along with other recent progress, raises the question of how emerging and future advances in genetics will update the ongoing discussion of the ethical nuances of business practice. A full discussion of such a broad question would be expansive. Thus, our effort focuses on a single practice: personnel selection.

We first highlight foundational elements within the fields of personnel selection and behavioral genetics that form the basis of our ethics discussion. At that point, we discuss the ways that emerging knowledge invites an updated discussion of the ethical nuances of four important topic areas within the context of personnel selection. This section approaches each topic generally, and then from the perspective of employers and of applicants. The four ethical topics are (1) the static (mostly) nature of genetic information that is out of an individual's control, (2) faking and lying during selection processes, (3) privacy, and (4) the threat of stigmatization of minority groups.

THEORETICAL AND PRACTICAL FOUNDATIONS

Personnel Selection

The field of personnel selection is generally concerned with identifying and validating methods for predicting future job performance. Decades of research has shown that the use of hiring methods with high validities leads to higher levels of employees meeting job performance criteria (e.g. Hunter, Schmidt, & Judiesch, 1990). Thus, linking valid predictors to desired or

undesired outcomes leads to higher levels of individual and organizational performance (Schmidt & Hunter, 1998; Wright & Boswell, 2002). There are a number of traits and characteristics, such as general mental ability (GMA), integrity, and conscientiousness, which predict a number of important individual outcomes (see Schmitt, 2012) such as overall job performance, turnover (Cascio, 1998), counterproductive work behaviors (Dilchert, Ones, Davis, & Rostow, 2007), organizational citizenship (Zhang, Bai, Caza, & Wang, 2014), and safety behaviors (Fogarty & Shaw, 2010). Additionally, organizations must use valid assessment tools to measure the various predictors. Schmidt and Hunter's meta-analysis (1998) discusses 19 distinct tools, some of which work well (e.g. structured employment interviews, work sample tests, and GMA tests) and some of which do not (e.g. graphology).

High validity is also important for the topic of job relatedness. More specifically, it is desirable to match job requirements with a candidate abilities (Caldwell & O'Reilly, 1990), which is more likely to be achieved when the validity of assessment instruments is high. Van Iddekinge and Ployhart (2008) add that valid selection procedures are vital for making selection decisions legally defensible. With so much riding on the validity and appropriateness of personnel selection predictors there is a clear need to continue the steady progress that has been occurring (Sackett & Lievens, 2008).

Researchers are continually trying to find ways to select the best employees from a pool of applicants. Could using a person's genetic information be a pathway to improving the measurement validity of existing predictors? Or will genetic information will help identify new predictors that are more proximal to selection criteria? If so, how will the expanded utilization of biological information in personnel selection necessitate an updating of the ethics discussion? These questions were relevant two decades ago (Arvey & Bouchard, 1994), and have become

more so in the time since. The trigger to all of this is the new knowledge emerging from the field of behavioral genetics.

Behavioral Genetics

The goal of behavioral genetics is to identify and describe the influences of genetics and environment on phenotype, the observable characteristics that result from genotype and environment. Early progress in this field is summarized in the "Three Laws of Behavior Genetics" (Turkheimer, 2000), which has been well accepted and consists of the following statements. *First Law*. All human behavioral traits are heritable. *Second Law*. The effect of being raised in the same family is smaller than the effect of genes. *Third Law*. A substantial portion of the variance in complex human behavioral traits is not accounted for by the effect of genes or families.

Much of the work has been done using twin studies (e.g. Eaves, Eysenck, & Martin, 1989; Loehlin, 1992) which early on focused primarily on the degree of heritability of various traits. Heritability (h^2) is defined as the proportion of phenotypic (observable) variance in a trait attributable to the sum of all genetic influences (Bouchard, 2009). In recent years, and consistent with the progress implied by the three laws, the field has largely moved beyond studies that focus on whether traits are heritable or not. Two major areas of current activity focus on (1) trying to understand how genetics and environment interact (Ilies, Arvey, & Bouchard, 2006; Johnson, 2007) and (2) isolating and identifying the actual genes that influence phenotype (e.g. Fullerton, et al., 2003). These two areas of research are each important to us, but for different

reasons. The first provides context for our ethical discussion, while the second speaks to the feasibility of applying this knowledge. We address each in turn.

Gene-Environment Interplay and Implications

The interconnectedness of genotype and environment helps dispel a commonly held notion that genetic information is inexorably deterministic. On the contrary, not only are genetic influences much more probabilistic than deterministic, they are only half (at most) of the equation. In fact, evidence suggests that genetic and environmental influences may be so interconnected that it is difficult to state how much of a trait or behavior is due to one or the other, much the way the occurrence of a leaky basement is at once ascribable to both the crack in the wall and the water outside (Olson, Vernon, Harris, & Jang, 2001). The nature of gene-environment interplay is two-fold.

The first type of gene-environment interplay is interaction effects (GxE). The case of phenylketonuria (PKU) is illustrative. Some individuals inherit a particular gene variant that prevents the metabolism of phenylalanine, an enzyme found in some foods. However, they will manifest no ill effects if those foods are avoided. Both the genetic and environmental factors must co-occur (GxE) for the effect to be manifest. Similarly, each of us has thousands of genes or groups of genes that will be expressed differently, or not at all, depending on the environmental influences to which we are exposed. Stated more generally, an environmental influence may have distinct effects on genetically distinct individuals (Johnson, 2007).

The other type of interplay is the gene-environment correlation (r_{GE}), characterized by an association between genetic differences and a particular environmental experience. This means people with certain genes tend to create or seek certain environments. For example, intelligent parents pass genes for intelligence to their children, but also tend to provide a home life characterized by intellectually stimulating experiences. One does not cause the other, rather, they tend to co-occur, often because their co-occurrence promotes survival (Ridley, 2003).

We highlight both types of gene-environment interplay because individuals that control some aspects of their environment, by implication, also control some aspects of how their DNA is expressed. Although genes are deterministic in some ways, such as determining eye color or possessing the gene variant for PKU, the effect of genes on complex behavioral traits is much more probabilistic in nature. This helps combat the false idea of pure determinism or genetic essentialism (Dar-Mimrod & Heine, 2011). This notion is consistently reinforced in social discourse as we hear from the media about genes being a "blueprint", or genes "hardwiring" certain behaviors into people. Thus, it is not surprising, that when people think their risk for experiencing a medical condition was ascertained by a genetic test, the condition is perceived as less preventable (French, Marteau, Senior, & Weinman, 2000). A similar study found that smokers who were informed of a hypothetical genetic predisposition to addiction were significantly less likely to attempt a cessation method that relied on "will power," suggesting that their sense of personal efficacy may have been undermined by knowledge of genetic information (Wright, Weinmann, & Marteau, 2003).

Despite this popular notion, both environmental and genetic behavioralists agree that genetic influence does not imply assured outcomes nor the inability to change (Bouchard, Arvey, Keller, & Segal, 1992). Genes establish predispositions that interact with environmental factors

which influence the likelihood of exhibiting attitudes, values, and behaviors. Furthermore, genes are a biological code to an entire behavioral system that has evolutionary merit more because it has adaptive value than because it decides or determines things (Ilies, Arvey, & Bouchard, 2006). Thus, even when heritabilities are very high (e.g., intelligence), environment and choice can still exert an influence. This understanding provides valuable context to our ethics discussion in three key ways. First, we highlight a pervasive false notion that is a part of the current social attitude toward genetic information. Second, a correct view of the nature of genetic information, as it pertains to the social sciences, offers improved clarity as to what may be considered ethical or not, and for what reasons. Third, we also note that a correct perspective on the probabilistic nature of genetic influence moderates what may seem like two competing claims: all behavioral traits are substantially heritable, but the influence of genes is not destiny. It is correct to see DNA as a significant but limited influence, much the same way environment exerts an influence on human behavior and traits, but is not the only important factor.

The Feasibility of Genetics Influencing Practice

In addition to contributions to knowledge, the field of behavioral genetics is also making important progress toward practical applications of that knowledge. Complex attributes such as behaviors and attitudes are influenced by the interplay between environment and multiple gene systems called quantitative trait loci (QTL). Numerous QTLs that predict heritable disabilities and diseases (e.g. Altshuler, Daly, & Lander, 2008) and that indicate stable personality traits and behaviors (e.g. Fullerton, et al., 2003) have already been identified.

One powerful technique used to identify QTL's (often referred to as linkage analysis) involves the utilization of a genetic shortcut that can be facilitated with the use of either extremely discordant or extremely concordant sibling pairs (Fullerton et al, 2003). This regression based approach relies on identifying relationships between genetic and trait similarities (Zeegers, Rijsdijk, & Sham, 2004). The difficulty in identifying the genetic basis of a complex human trait such as a behavior is that each locus will have only a small phenotypic effect, necessitating very large sample sizes. The amount of genotyping required to detect a QTL can be reduced considerably, however, by utilizing "genetically informative pairs," those sibling pairs most likely to deviate from the expected proportion of shared gene variants (Heo, Faith, & Allison, 2002; Risch & Zhang, 1996). This method was used by Fullerton and collegues (2003) to identify QTL locations on chromosomes 1, 4, 7, 12, and 13 which collectively account for 23% of the phenotypic variance in neuroticism. The authors note that the 5 identified QTLs explain roughly half of the known heritability of neuroticism (41% to 48%) which can likely be improved upon with larger samples.

Other QTLs have been located that are linked to additional personality traits (Cloninger, et al., 1998) and a host of other traits and behaviors ranging from panic to cigarette smoking (see Almasy et al., 2001; Duggirala, Almasy, & Blangero, 1999; Porjesz et al., 2002; Williams et al., 1999). These results are indicative of the ongoing progress, but work remains to be accomplished in order to render genetic information useful in a personnel selection context. Linkage analysis points scientists to the chromosomal regions, not the exact genes that influence the traits. The next step, which is also already underway, is to determine which specific genes influence the traits and describe their effects as well as the specific DNA variations within the genes (Almasy & Blangero, 2004). In some cases, molecular-level genetic research has already

identified the exact genes that relate to specific traits (e.g. Hamer & Copeland, 1998). As this work continues, identifying and utilizing predictors and criteria relevant to personnel selection will become a genuine possibility.

Financial feasibility is another consideration. Employers already expend substantial resources to acquire new hires. For example, in the hospitality business, new hires costs organizations $6,000 per worker and $10,000 per manager (Tracey & Hinkin, 2008). In contrast, the cost of genetic testing ($15 to $60) or more extensive genotype screening ($100 to $500 for standard complexity testing) (National Institute of Health, 2014) is a fraction of the cost of standard selection procedures that often include an array of activities including phone and/or in-person interviews, work samples, and personality inventories. Thus, it might not be considered financially prohibitive to many employers to pursue such measures. For now, however, it remains unclear how screening for relatively well understood diseases will compare to screening for complex behavioral traits that may be influenced by a much greater volume of DNA sequences.

In summary, the progress of behavioral genetics is promising, but not yet fully developed. Despite the financial feasibility of introducing genetic testing into personnel selection practice, the requisite clarity of relevant genetic markers, in most cases, remains a work in progress. Because of this, we pursue our ethics discussion in the spirit of anticipation and preparedness for what lies ahead.

Heritability of Predictors and Criteria Relevant to Personnel Selection Practice

Continued progress in the field of behavioral genetics very well may open the door for the genetic screening of important personnel selection predictors and criteria, many of which have already been identified as substantially heritable. It is important to note, however, that if the first law of behavioral genetics is accepted as true, identifying which traits or behaviors are heritable is of limited utility. While we do provide examples of a number that are heritable, it is in large measure because it is illustrative of the broader fact that all behavioral characteristics are partially determined by genetics. Not every personnel selection predictor or criterion has been studied, but enough have that we understand and conclude that behavioral genetics principles correctly apply here – to those cognitive and behavioral characteristics that have and that have not been explicitly studied. Thus, we highlight only a limited number of predictors and criteria as representative of the broader list.

There are at least two ways to connect genetics to the practice of personnel selection. First, is the potential for improving the validity of predictors of job success, such as GMA and conscientiousness. This assumes current predictors are imperfectly measured and that genetic measures offer the potential for improvement. Ongoing progress in the field of behavioral genetics will determining the extent to which this is true. The other way to connect genetics to practice is to skip the predictors and identify the genetic bases of the selection criteria themselves. This approach assumes current predictors do not perfectly predict selection criteria, which generally they do not (Hosmer & Lemeshow, 2005), and that genetic measures of criteria will provide utility in excess of existing predictors. We briefly mention a few examples where there is potential for these conditions to be met.

Predictors. *General mental ability* (GMA) is the single best predictor of general on the job performance and job training (Schmidt & Hunter, 2004). It predicts job performance across

virtually all types of jobs, even those involving only the most basic and simple tasks (Schmidt & Hunter, 2004). GMA also extremely heritable. Beaver and colleagues (2013) place the estimated heritability of intelligence to be somewhere between .66 and .83. Others have estimated the heritability to be around 0.50 (Chipuer, Rovine, & Plomin, 1990; Devlin, Daniels, & Roeder, 1997), but fail to take into account that IQ heritability has been clearly shown to increase with age (Boomsma, Busjahn, & Peltonen, 2002; Bouchard, 1998) which fact might indicate that a genetic measure of GMA would be an increasingly valid predictor of job performance as job candidates age.

Personality is another important predictor of both job performance and job training and in many cases adds substantial explanatory power above and beyond GMA (Schmidt & Hunter, 1998). Personality also predicts a number of relevant employee behaviors (Cooper, Knotts, McCord, & Johnson, 2013). Personality research has been focused on the Big Five model (Goldberg, 1990) because it is a valid portrayal of personality across times and cultures. Loehlin's (1992) h^2 estimates for emotional stability, extraversion, openness to experience, agreeableness, and conscientiousness were .41, .49, .45, .35, and .38, respectively, indicating considerably heritability. While all five are heritable, Conscientiousness alone has been found in robust meta-analytic studies to consistently predict job performance (Mount & Barrick, 1995). Interestingly, while personality is somewhat malleable, the stability of personality is strongly influenced by genetics (McGue, Bacon, & Lykken, 1993). In fact, it is largely due to genetic influences that individuals maintain the portion of their personality that makes them predictable, recognizable, and unique (Ilies, Arvey, & Bouchard, 2006). The implication then, is that a genetic measure of conscientiousness might, particularly across time, be a more reliable predictor

of job performance than a standard measure that captures both the stable and unstable aspects of personality at a single point in time.

Criteria. The criteria for personnel selection are numerous and often depend on the specific job functions. On-the-job performance and job training, or job learning, are two broad criteria of importance. Because they are substantially predicted by heritable predictors such as GMA and conscientiousness they are potentially heritable themselves, but to date no study has sought to determine their heritability. However, a number of other selection criteria have been investigated. For example, j*ob and occupational switching* has two heritable dimensions: the frequency of changing jobs (.36) and the frequency of changing occupations (.26) (McCall, Cavanaugh, Arvey, & Taubman, 1997). *Leadership* has a multiple correlation with the Big Five .48 (Judge, Bono, Ilies, & Gerhardt, 2002), suggesting that leadership is at least partially dispositional and likely to be genetically influenced. However, identifying a universal h^2 has been problematic as heritability is not constant across subjects (Ilies, Arvey, & Bouchard, 2006). *Counterproductive work behaviors* have also been shown to be significantly heritable (Jockin, 1998) with h^2 of .37. These heritable behaviors provide us early examples of ways that genetic information could afford employers updated practices for measuring important selection criteria.

ETHICAL ISSUES AND DILEMMAS

The question of the ethicality of using genetic information in a personnel selection context increases in complexity in part because we are not fully informed as to the entirety of our future capabilities or as to their validity. Certainly there exist a number of unethical uses of genetic information in a personnel selection context, such as discrimination against those with a high

likelihood of extensive medical expenses as indicated by genetic predispositions. However, some of the difficulty and the importance of this question also lie in the fact that there are differing perspectives on ethics, not all of which are compatible. Not everyone agrees on what is ethical and what is not. Cases of mutual benefit, we argue, provide a basis for realistic opportunities for situations wherein genetic information could be appropriately used. The potential benefits to employers might include data that suggests the absence or existence of heritable individual attributes, attitudes and behaviors deemed important for their employees. The downstream potential benefits might include increased job satisfaction, increased job performance, lower turnover, and improved efficiency in both job search and in personnel selection, which are all relevant outcomes. Job seekers might benefit by using genetic information to help identify areas of strengths and weaknesses that they can match to ideal jobs, thus increasing their job satisfaction or likelihood of excelling. They may also use genetic information about themselves to avoid job environments that might interact adversely with their genotype. For example, workers that are predisposed to lung cancer could avoid working in coalmines, or those with a predisposition for cardiovascular failure could avoid high stress lines of work. In summary, both sides might agree to allow limited use of genetic information when they each perceive benefit. Because such scenarios are likely to exist, it also becomes important to guard against unfair or unethical uses performed under the guise of ethical ones.

In proceeding, we realize that there are at least four different perspectives that could be addressed when it comes to genetic testing in the personnel selection process; those being the perspectives of employers, employees, applicants, and society. As this paper focuses on the hiring process, we address the perspectives of the employer and the applicant. The perspectives of existing employees and of society could be addressed in future research. In pursing these two

perspectives, we address a handful of critical ethical considerations, but no attempt is made to comprehensively identify all issues nor to stage varying ethical stances and pit them against each other.

Lack of Individual Control

One particular reason the use of genetic information may be considered unfair is that this (mostly) static set of biological information is out of one's control. Despite this fact, if the genetic information has been scientifically shown to be a valid predictor of job-relevant characteristics or job performance itself, this could be considered just as fair and appropriate as current selection methods that are also often based on information that is beyond the complete control of an applicant. Recognition that genes do not imply inability to change does remove some of the ethical specters of using genetic information. Nevertheless, understanding the probabilistic nature of genetic influence does not change the fact that a test that maps one's DNA will show the same DNA now that it will show in 20 years, and therefore, identical methodologies will arrive at identical conclusions regardless of time, change, and actual behavior. Granted, not all genetic tests (as defined by the Genetic Information Non-discrimination Act) are limited to the investigation of fully static genetic structures (epigenetics will be discussed later), but, by and large, if an individual possesses a predisposition for a behavioral trait such as extraversion, that predisposition is in their genes and does not go away. Consider, for example, that an applicant may be strongly genetically predisposed to be very unconscientious, but for whatever reason they never manifest that predisposition and are actually highly conscientious. Essentially, a genetic test with high validity across groups of people

retains the potential to be unfair to the subgroup of people that have never manifested certain predispositions, or that have managed to change. This issue of the pliability of human characteristics is worth addressing further, both from the side of job applicants and from the side of potential employers.

Applicant Perspective. Some job candidates that are subjected to genetic testing are likely to perceive this type of testing as unfair. A screening based upon genetically influenced traits is simply out of one's control, due to the fact that genes are not a controllable characteristic. However, the unchanging part of our biology is not a sole or isolated contributor to the key factors upon which job seekers are screened. In other words, our static genes do not, of necessity, produce static attributes, nor do they predestine key personnel selection attributes. Thus, the notion that genetic information will ultimately lead to being selected unfairly is false, but only inasmuch as it is recognized by employers or applicants as not truly deterministic.

Employer Perspective. On the hiring side of personnel selection, there is substantial potential for decisions to be based on changeable criteria as if they are actually not changeable. At least two reasons to reject this view of genetically influenced job qualifications are highlighted. First, DNA can change – the field of epigenetics has demonstrated this phenomenon recently. Essentially, behaviors and environment can play a role in modifying the structure of our DNA, and those modifications can persist and even be passed on to offspring (e.g. Champagne, 2008). Second, as previously discussed, genetic influence in no way precludes change, especially for complex behavioral traits and attitudes.

A related ethical point is that selection based on personal genetic characteristics already occurs. When a selection process identifies candidates high in conscientiousness and GMA, that

process is already biased towards individuals with genetic influences for those traits: for example, in the case of GMA. While individuals have considerable control over their high school or college GPA, it is difficult to argue that all individuals have complete control. It is typically ideal to select the candidate with the highest levels of predictors, such as intelligence, with little or no concern over whether this is within the applicant's control. This is particularly true, even for legally protected characteristics, in the case of job relatedness (Schwartz, 1978). No one screams of inequity when, for example, Kareem Abdul Jabbar makes a living playing basketball even though someone else (who is 5'6") tried harder than he did but failed, or when Albert Einstein developed his theory of relativity more ably than past attempts (perhaps by those with lower IQs). This view on ethics is one that we suggest should not change merely due to increasing access to and understanding of genetic information. Whether Kareem's height or Albert's intelligence is measured genetically, instead of by a ruler or IQ test, does not alter the ethics of a practice, all other things (such as validity) being equal. Thus, in cases where GPA is used as a proxy for GMA, and even more so when a more proximal measure such as the Wonderlic test (Wonderlic, 1992) is the measure of choice, individuals are bounded by their genes and therefore discriminated against on the basis of genetic influences beyond their control, and appropriately so when the job requires it. The same logic can be applied to any trait that is significantly heritable. As such, employers past, present, and future have utilized various methods to assess an applicant's fit, both for a particular job and with an organizational culture (von Walter, Wentzel, & Tomczak, 2012).

Regarding change, an additional argument in favor of the careful consideration of genetic information being useful in a personnel selection context is that genes and environment constantly interact. In fact, recent research has attempted to bridge the gap between epigenetic

events and behavior by emphasizing the significant roles of environmental interactions and genes (Jackson, Niculescu, & Jackson, 2013). Gene expression is fundamentally tied to environmental exposure. Genes do not simply determine one's traits; rather they predispose individuals to differential sensitivities to various environments. One must discuss genetic influence in terms of likelihood of emergence and in terms of gene-environment interplay. In other words, job candidates have latent traits that will not show up on a paper and pencil test because they do not yet exhibit the trait. Once placed in a new environment, genes are triggered and individuals might display behaviors, attitudes, and traits that were previously unexpressed (Johnson, 2007). Indeed, people occasionally surprise themselves when placed in an unfamiliar situation, noting that, "I didn't know I had it in me." Because of this, genetic information may be able to predict performance in ways current instruments cannot.

This argument is consistent with the interactionist principle of trait activation which suggests that some traits will be expressed in reaction to situational cues (Tett & Burnett, 2003). Personnel selection practices that neglect the consideration of what individuals may become as they interact with the impending job environment could be considered incomplete.

Applicant Faking and Lying

One intriguing ethical advantage regarding the usefulness of genetic information deals with the difficult nature of preventing, or unraveling the effects of, the faking of paper and pencil or verbal assessments. Two key issues are (1) the ethics of faking and lying and (2) how these deceptive behaviors affect selection validity.

First, cheating, and dishonesty more generally, in the workplace is a central concern of business ethicists (Bratton & Strittmatter, 2013). We know from recent studies that cheating is prevalent among college students, but it also persists into professional life after graduation (Hsiao & Yang, 2011). Past research has demonstrated that a significant proportion of applicants misrepresent themselves on personality measures when potential employment is at stake (Peterson & Griffith, 2006). As a result, scholars have been active in calling for the development of non-fakeable measures of personality and attitudes and in pursing ways to prevent faking (e.g., Levashina & Campion, 2007; Sackett & Lievens, 2008) or for the development of different measurement techniques (Sackett & Lievens, 2008). Short of individuals swapping genetic material in ways typically saved for science-fiction movies, genes have the potential to provide such non-fakeable measures.

Second, there has been some debate over whether faking is truly an issue of concern (for examples see Morgeson, Campion, Dipboye, Hollenbeck, Murphy, Schmitt, 2007; Ones, Dilchert, Viswesvaran, Judge, 2007; Tett & Christiansen, 2007), with some scholars claiming that everyone fakes uniformly. Others have claimed that while differential faking does occur, it does not impact the validity of the personality test or even improves validity (Tett & Simonet, 2011), thus using tests known to be fakeable is justifiable. Still others have argued that faking is an indicator of productive job behaviors and is therefore desirable, but only for certain types of jobs (Peterson & Griffith, 2006). This issue, of course, has two distinct sides to it. Whenever two parties contemplate an employment relationship, they must accomplish two tasks: first, whether to offer or seek employment, and second, successfully persuading the other party to agree to an employment arrangement (Marcus, 2009). Thus, we examine both sides briefly.

Applicant Perspective. Faking on an employment assessment is not just of concern to a potential employer. From an applicant's perspective, when he or she fakes on a personality test, he or she could be attempting to adapt his or her self-image to the situational demands of that particular job and employer. As such, there is some debate as to whether faking should be of concern (Marcus, 2009) since the potential employee is already trying to fit in with the work environment and culture. Even though lying is thought of as common practice (Weiss & Feldman, 2006), it is unethical to lie. Furthermore, individuals might be concerned about faking and lying because those honest applicants that do not lie might be at a disadvantage when others do (Morgeson et al, 2007a).

Employer Perspective. Employers desire selection methodologies to be accurate in identifying candidates that will be productive employees. Although faking can be viewed as deviant, some past research has demonstrated, ironically, that faking during the interview process can be seen as a positive indicator of future performance (Tett & Simonet, 2011). As performance has been referred to as the joint product of opportunity, ability, and motivation (Blumberg & Pringle, 1982), an employer might prefer an employee who possesses these motivational qualities, even if those qualities are manifest as faking or lying during the hiring process. Contrary to this train of thought, in a field study utilizing data from 162 individuals seeking employment – and subsequently having been hired – in the pharmaceutical industry, Donovan, Dwight, and Schneider (2014) demonstrated that those employees who faked during the hiring process, were later found to exhibit lower levels of performance than non-fakers. Thus, there is an ongoing debate regarding the impact to predictive validity of faking and lying. In short, beyond the possible epistemological advantage, the level playing field where cheating or faking is not realistic, as in the case of genetic testing, provides ethical appeal.

Some scholars believe it is unethical for employers to use selection procedures that allow faking because it can hurt honest candidates that do not fake. During a panel discussion with former journal editors on the topic of personnel selection, one panelist, Michael Campion, stated, "I have an ethical problem with using selection procedures that are easily fakeable because some candidates are going to be damaged. The fact that we cannot figure out exactly who they are does not change the fact that somebody is being denied employment because somebody else is lying," (Morgeson et al, 2007a, p. 712). Campion's focus on the individual here is exceedingly appropriate in the discussion of genetics and ethics. The impact of using non-fakeable measures gets at the core of individual differences that scholars seek to accurately describe and analyze.

Privacy Issues

One of the less debatable aspects of the use of genetic information is regarding the privacy issues that surround it. In our society, most people not only view genetic information as highly sensitive, but also take careful measures to safeguard its privacy (Husted & Goldman, 2002). Since 2009, when the Genetic Information Nondiscrimination Act (GINA) took effect, companies are banned from discriminating on the basis of genetic information (Library of Congress, 2008). Despite the illegal status of basing employment decision on genetics assigned by GINA, there are at least two reasons to consider the ethical implications anyway. First, laws change as society changes – especially in terms of emerging scientific discovery. Recent history provides numerous examples of laws that change under pressures of social opinion (e.g. prohibition, women's voting rights, stem cell research, same-sex marriage). As the technology matures and as the ethics discussion takes shape, prevailing views on the utility and

appropriateness of limited or controlled usage of genetic information may shift. Thus, we strongly encourage the ethics discussion to take place. Second, despite the illegality of doing so, there is potential for purposeful or unintentional breaking of this law – especially as genetic information proliferates in terms of accessibility and normalness. Much the way companies frequently ask illegal interview questions, if things progress to the point where genetic information feels harmless or obvious, the letter of the law could be ignored in certain ways. For example, if applicants are proud of something their DNA suggests, it could easily be a side note or even a comfortable conversation topic within an interview. Furthermore, EEOC regulations identify six specific ways to gain genetic information that does not violate GINA, such as wellness programs, drug screening, and certification for FMLA leave (Library of Congress, 2008). Thus, employers have ways to legally acquire genetic information of potential and current employees and are then left to use the information only appropriately (by keeping it in confidential files). Because GINA does not prohibit this access, and because laws change, the ethics of using genetic information from applicant and employer perspectives is still important.

Applicant Perspective. Human resource practices already focus on many factors that are highly heritable (e.g., GMA and personality), and in the hiring process we already give up some privacy rights in order to benefit (land the job). Job seekers could have compelling reasons, and the right, to extend privacy rights into the realm of their own genetic information. There is, of course, the argument against the use of genetic information in personnel selection. Since such genetic information potentially discloses what should be irrelevant information, this data could be inappropriately used to make hiring decisions. In fact, the initial reason the practice was outlawed was because it could disclose health issues of applicants that would raise the employer's health premiums, enabling them to discriminate against high cost employees and

applicants (Library of Congress, 2008). Not only can genetic information disclose health issues, but genetic information could also reveal various human characteristics such as personality or behavioral traits that may or may not even be actively exhibited. Some human traits are triggered by environmental stimuli, and there is no guarantee that a person's heritable traits will be triggered at all at any point. Of course, savvy job seekers do not typically seek to tout their negative qualities, but positive impression management is a common tactic (Bolino, Kacmar, Turnley, & Gilstrap, 2008), which nowadays can possibly come in the form of sharing personal information, even genetic information, that places themselves in a positive light.

Employer Perspective. Current hiring practices already focus on heritable attributes such as whether a person is likely to work conscientiously or exhibit high levels of commitment to the organization. Interviews often include behavioral questions or include paper and pencil instruments that determine these qualities. Unfortunately, these methods may fall short when describing the actual or potential traits of the individual due to practices such as impression management or even outright dishonesty (Shoss & Strube, 2011). Such a situation might provide candidates a compelling reason to offer suitors a genetic measure that is unfakeable. While this is certainly not standard practice today, such an action possesses the potential to send what might realistically be perceived by an employer as an unmistakable signal of aptitude and confidence on the part of the candidate.

If candidates choose to offer genetic information to potential employers, the next layer of issues becomes critical. What exactly can an employer do with such information and still avoid violating the GINA? Does the candidate retain control of the information or have they ceded that right to the company? Does it become standard practice to the degree that those that choose not to provide positive information are assumed to be hiding negative characteristics? Does the

practice come too close to violating that GINA that employers refuse to accept the information, or, on the contrary, do they choose to accept it, but do so informally? These types of issues will need to be considered in the near future as these possibilities are now emerging as potential hiring practices.

Stigmatization of Minority Groups

There are a number of reasons why genetic information might promote the stigmatization of minority groups. One is that the DNA samples of minorities are more likely to have been gathered than non-minorities. That might seem odd, but there are valid reasons why behavioral genetics has ever "targeted" racial or ethnic groups to begin with. First, populations with many similar gene variants reduce the statistical "noise" in linkage analysis and thus minority groups have proven to be genetically useful samples (Cardon, 2003). Ironically, the very characteristics that make a population useful also expose them to being labelled as genetically distinct, which is at the heart of the issues discussed in this section. Second, the largest U.S database of genetic information is gathered by the criminal justice system. Consequently, analyses of the criminal population are inescapably skewed toward any minority group that might be overrepresented relative to population proportions. Availability of data, in itself, will not promote stigmatization, but analysis of that data might since research using available data will be more likely to identify genetic differences among those groups represented in the samples. As genetic differences are identified, research has found that the consideration of differences across groups appeals to a prevalent societal desire to explain racial differences at a genetic level (Rothenberg & Wang, 2006).

A propensity to stereotype based on easily observable characteristics is another, somewhat paradoxical reason why genetic information can lead to stigmatization. Ironically, the unseen genetic basis of a heritable, but observable behavioral trait may have greater potential to lead to unfair stigmatization than does a less observable genetic diseases because, in addition to those that exhibit the behavior due to genetic influence, many other individuals that exhibit the behavior are *not* doing so due to genetic influences. Consequently, external observers may group the genetically influenced individuals together with those that are fully "at fault" for their behaviors (Rothenburg & Wang, 2006). For example, as long as some individuals exhibit aggressive antisocial behaviors at work due to individual agency, those that exhibit such behaviors due to genetic predisposition will bear a burden of proof that they, unlike their counterparts, did not "elect" to behave that way. Such a burden would not exist for individuals with conditions such as sickle-cell anemia.

A third potential reason genetic information may lead to stigmatization is that it is, frankly, easy to study discrete and identifiable groups. Not only that, but it is also federally mandated that certain types of research include racial and ethnic identifiers (NIH Revitalization Act, 1993). Taken together, researchers are primed to notice and even seek racial or ethnic differences.

Applicant Perspective. The use of genetic information has the potential to be a mixed blessing for ethnic and racial minorities. On one hand, the use of genetic information provides a persuasive mechanism through which damaging and unfair racial and ethnic stigmas could be eradicated since there is widespread agreement among scientists that there is almost no biological basis for the concepts of race or ethnicity (e.g. Anderson & Nickerson, 2005). However, since there *are* a few instances of inter-race genetic differences that are far less

observable than visual race or ethnicity cues, race and ethnicity are frequently used for making biological inferences (e.g. Gil-White, 2002), whether accurate or not. Coupled with that is the unfortunate finding that using biological attributions is related to higher levels racist attitudes. The result is that genetic essentialism, which is a prevalent mindset in society (Dar-Nimrod & Heine, 2011), actually exacerbates racist sentiments (Condit, Parrott, Harris, Lynch, & Dubriwny, 2004; Keller, 2005). In addition to actual genetic differences, there is, as previously discussed, a tendency to attribute racial and ethnic differences to genes. This is not a harmless misconception. Past research shows that beliefs about genetic differences across races are highly correlated with measures of discrimination (Jayaratne, 2006, 2009). Beyond dealing with actual discrimination, those individuals who know their race or ethnicity might be associated with genetic "redflags" might automatically self-disqualify for particular jobs, even though they might not possess the actual undesirable genes and might possess ideal skills for a particular job.

Despite these possible issues there is still potential for benefit to minority groups. Perhaps the most important is the collection of findings showing that there are not many genetic differences across groups that are relevant to employment. The value lies in dispelling myths and inoculating society against additional bigotry that often accompanies race-oriented genetic attributions. For example, while 62% of white Americans believe in a genetic foundation for counterproductive work behaviors such as aggression and criminality (Jayaratne, 2002), there is very little empirical evidence to support this conclusion (Alper, 1995; Caspi et al., 2002; Raine, 1993).

Employer Perspective. Most of the genetic differences across racial and ethnic lines that lead to opportunities to benefit minority groups are not differences that are relevant to personnel selection. For example, certain proclivities for serious diseases are more common for certain

racial or ethnic groups. Sickle-cell anemia amongst African Americans and the Tay-Sachs gene amongst Ashkenazi Jews are well known examples. While this has led to some positive outcomes for minority groups, such as drugs like BiDil being invented and marketed specifically for African Americans, these types of efforts might unintentionally exacerbate false perceptions that races are more biological distinct than they actually are. Furthermore, scientists and sociologists have warned that this practice, which is encouraged by the Food and Drug Administration, is a medical form of affirmative action that may prompt racial tension in ways similar to affirmative actions in employment and higher education arenas (Rothenberg & Wang, 2006). While specialized offerings would be a welcome boon, there is also a risk that special treatment will stigmatize groups as "undeserving" (Grutter v. Bollinger, 2003) or "entitled".

Beyond using valid information that might lead to the unintended consequence of perpetuating stereotypes and racism, basing decisions on categorically faulty logic is another ethical pitfall to using genetic information for personnel selection, which could lead to lawsuits and public disapproval of an employer's image. In particular, Dar-Nimrod and Heine (2011) identify two key fallacies related to the highly contentious assertion that there might be a genetic basis for racial differences in intelligence. While it is a fact that Black Americans score lower on intelligence tests than White Americans, the conclusion that the difference is due to genes (e.g. Herrnstein & Murray, 1994; Nisbet, 2009) is dubious. It is commonly known that there is a difference across groups, and that intelligence is highly heritable. However, despite the alluring implications of genetic essentialism, it is not known whether the variance is due to genetic differences or the effects of environment. The first fallacy of the genetic-based conclusion is that within group heritability "proves" that between group differences are due to the genes that underlie the heritability estimate. This falsely assumes that genes are the only factor explaining

both within and between group variations. The second fallacy is that a heritable trait is not cable of changing due to the influences of other factors. Heritability does not presume predetermination nor immutability. In fact, it says absolutely nothing regarding the modifiability of a trait. The conclusion is that the essentialist biases prevalent in society, even among highly educated professionals, prompt erroneous logic regarding the role of genetics and racial differences. Employers might also fall into this trap with regards to using genetics in personnel selection. In the end, gathering, utilizing, or even referring to genetic information creates an impulse to deem DNA as destiny, which can encourage job recruiters and job seekers to focus on job criteria ineffectively.

CONCLUSION AND LIMITATIONS

The intersection of science and business continues to emerge and evolve. As it does, it is important to begin and maintain productive discussions about the ethical and social implications. Due to the nature of emerging science, there is potential for understanding to lag behind practice as invention and discovery lead to new questions. Ironically, academia might more consistently complain about the opposite: that practice lags behind our theoretical understanding. While either scenario may be less than ideal, we can readily address the former. To counteract this phenomenon, we seek to advance the discussion of the ethics of using genetic information in the workplace before practice outpaces understanding. With this goal in mind, we have introduced several foundational elements to aid in understanding the emerging implications of the biology of personnel selection. Our four areas of ethical discussion are not a comprehensive list, but highlight key areas that are important to discuss. Their importance is due to the potential for

unethical attitudes and practices, but also because there are both ethical pros and cons to many topics, such as with the issue of applicant faking and lying.

A main shortcoming of this paper lies in the fact that there is much yet to be determined with respect to technological advancement in the fields of genetics, genomics, neuroscience, and the biological sciences in general. However, this is also the point, and the basis of our contribution. The uncertainty inherent in the advancement of science, both social and natural, makes discussing future possibilities not only interesting but valuable.

An additional limitation is the tradeoff inherent to the discussion of a multifaceted topic intended for a diverse audience. It is our goal as authors to reach a broad audience, and as such, we have included simplified summaries that provide access to an interesting and complex discussion. Unfortunately, there are many topics that are left underdeveloped in favor of conciseness. One such topic includes the implications to the 1990 Americans with Disabilities Act (ADA) and how GINA might reinforce or alter the implication of the ADA. This should not impact the goal of the paper which is to provide structure to an important discussion of the ethics of using genetic information in a personnel selection context.

There are a number of avenues for extending this line of research and discussion. We have mentioned that the ethics of genetic information in the workplace could be explored from the perspectives of existing employees and from society at large in addition to the perspectives we chose to discuss – that of applicants and employers. Beyond this, it would also be of value to formulate this conversation in terms of the various ethics philosophies such as comparing normative philosophies such as hedonism and utilitarianism to more applied philosophies such as relational or business ethics. We believe our chosen approach allowed us to relate new biology

and its potential impact more closely to the detailed nuances of current practice, but a philosophical approach might have other strengths and contributions. Our contribution to the ethics conversation includes a concise explication of what we know, the potential usefulness of that knowledge, and the ethical implications, including potential benefits, potential problems, and associated dilemmas, of that knowledge, organized into four topic areas. We hope this research serves to raise appropriate questions that will lead to an important, responsible, and interesting dialogue.

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