

The validity of VisualDNA's image-based personality tests in the prediction of consumer behaviour

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Abstract

Personality is a strong predictor of real-life outcomes and behaviours. Personality assessment has been employed in numerous fields of academic as well as commercial settings, and enables the prediction of a wide range of behaviours in both the physical world as well as the online space. VisualDNA has developed an innovative online image-based assessment methodology to measure personality. Visual questionnaires offer a fun, interactive and gamified experience, while maintaining the validity of the outcome measures. The methodology was applied to create a portfolio of reliable personality assessment tools. The tests have been applied in multiple commercial settings and have successfully predicted valuable outcomes for businesses. This paper describes the theoretical foundations and validation process of our assessments, and concludes with case studies that provide concrete examples of the applications of these tests.

Personality predicts behaviour

A vast body of psychological research relates real life outcomes to variance in personality traits.

Examples range from academic achievement (Chamorro-Premuzic & Furnham, 2003), job performance (Barrick & Mount, 1991, 2001), subjective well-being (Weiss, Bates, and Luciano (2008), health and longevity (Kern & Friedman, 2011) and a range of other real-life outcomes (Ozer & Benet- Martinez, 2006; Roberts et al., 2007). Central to our methodology, the following review looks at the relationship between personality and consumer behaviour in specific.

The 'Big Five' dimensions of personality

Psychologists have studied personality extensively over the past several decades and many theories have been developed regarding its definition and the traits that it encompasses. A major consensus has been reached in the 1990s (Digman, 1990) with the Five Factor Model (FFM) exemplified by Costa & McCrae's work (1987). Norman (1963) and Tupes & Christal (1961) have been regarded as the original fathers of the FFM which states that individual differences in personality can be categorised into five major traits: Neuroticism, Extraversion, Agreeableness, Conscientiousness and Openness to Experience. These traits, also known as

the “Big Five”, have become universally known and are used by researchers and practitioners alike: there is in fact substantive evidence for the use of the FFM as a framework to describe individual differences in personality which are generalisable across cultures (Costa & McCrae, 1992; McCrae & John, 1992). Although different taxonomies and labels exist for each of the five personality dimensions, the model is generally agreed upon and is used as the main classification of personality traits. These traits are defined as “personal dispositions that are stable over time and that influence a person’s patterns of behaviours in different situations” (Chamorro-Premuzic, 2007).

Costa & McCrae (1995) state clearly the causal link between traits and behaviour: since traits are dimensions of individual differences that are underlying tendencies, they explain (albeit in part and indirectly [Hampson, 1992]) the thoughts, feelings and actions of individuals. Moreover, since they are defined as stable dispositions that are related to outcome variables such as behaviours, it can be inferred that predictions can be successfully made from personality traits for various purposes ranging from work-related to consumer behaviour and preferences.

Personality and consumer behaviour

Personality, and specifically the Big Five traits, have shown to predict behaviour and preferences in every aspect of consumerism, from brands and products to tone and content of messaging strategy.

A number of studies have found a link between consumer personality and preference for brands exhibiting the same or similar personality traits (Huang, Mitchell & Rosenaum-Elliott, 2012; Branaghan & Hildebrand, 2011).

Personality has also been linked with consumer and product preferences. For example, extroverts are more likely than introverts to own a smartphone (Lane & Manner, 2011); Conscientiousness is related with prestige-seeking consumer behaviour, while open people are less interested in prestige-seeking since they prefer nonconventional products (Vigneron & Johnson, 1999).

A large body of research delves into the relationship between personality and purchasing behaviour. A number of studies have found that Openness is related to the propensity to be influenced by external information such as anchors (McElroy & Dowd, 2007); extroverts have consistently been found to be good at negotiation (Barry & Friedman, 1998); and Conscientiousness is consistently related to superior money management (Donnelly, Iyer & Howell, 2012). Excessive buying is positively correlated with Neuroticism and negatively with Agreeableness and Conscientiousness (Herabadi, 2003), and positively with Materialism

(Johnson & Attmann, 2009) - a psychological construct that refers to the excessive desire to consume and acquire material goods.

Personality and online behaviour

Since behaviour is explained by psychological constructs and personality traits, online behaviour in particular has become an active area of research. Kosinski, Stillwell, Kohli, Bachrach, & Graepel (2012) have found significant relationships between the personality of website users and website preferences. Not only does this research state that individuals' personality plays a role in their choice of websites, but it also implies that personalities are manifested through and can be predicted from online browsing behaviour. In a related study, the research group developed models that successfully predict personality traits and attributes through big data collected from social networks such as Facebook (Kosinski, Stillwell & Graepel, 2013).

Other researchers have also endeavoured to predict personality through individuals' use of Social Networking Sites (SNS) and have found that Openness is positively linked with increased SNS usage, for example (Bai, Zhu & Cheng, 2012). These ground-breaking studies (among many others) relating big data and machine learning methodologies have revolutionised the research on online behaviour and personality.

With the rise of blogging over the past few years, researchers have also studied the link between personality and tendency to blog. They have found that Openness to Experience and Neuroticism predict blogging (Guadagno, Okdie & Eno, 2008). As blogs are a recent form of online behaviour as well as a medium of self-expression, individuals who are creative and have high levels of intellectual curiosity are likely to create and maintain a blog.

Personality, Popular Culture and Entertainment

Personality predictors of media preferences have been explored extensively, with a notable interest in the relationship between personality traits and preferences for entertainment and forms of culture such as music, film, television, video games, and general fandom.

Personality and music preferences

Numerous studies have established a relationship between individual differences to musical preferences. Rentfrow and Gosling's (2003) work focuses on the psychology of musical preferences. They found that

"the structure of musical preferences could be organized in terms of reflective/complex, intense/rebellious, upbeat/conventional and energetic/rhythmic

compositions, and that these dimensions are not only associated with the level of complexity, emotionality and energy of musical compositions, but also individual differences in personality, ability and self-perception.”

For example, individuals who are high on the Openness to experience scale enjoy more complex music such as jazz. Chamorro-Premuzic (2007, 2010) focuses on the uses of music with relation to personality and individual differences and states that personality influences why and how people listen to music. One finding is that people who are high on Extraversion listen to music to increase their arousal especially when doing monotonous or routine tasks. It has also been shown that people high on the Neuroticism scale as well as introverts use music to regulate their emotions and are more easily affected by the emotionality of music.

Personality and film preferences

It has been found that there is a notable relationship between the Big Five personality dimensions and film genre preference (Chausson, 2010): for example, individuals high on Openness tend to prefer comedy and fantasy films, but not romantic films. On the other hand, individuals high on the Conscientiousness dimension are more likely to enjoy action movies than romantic films.

Other studies have looked at film preferences in relation to individual difference variables relating to preference for complexity (e.g. Need for Cognition, Openness, and Open-mindedness) and have found that individuals who have higher Need for Cognition and who are more open-minded prefer complex films (Van Ness, Hord & Keith, 2013). Generally, there has been a considerable amount of research done on linking personality with film preferences and it is clear that personality traits contribute significantly to a better understanding of individuals’ tendencies and preferences when it comes to film genres.

Personality and television consumption preferences

Personality traits were used to predict media use and content preference (Hall, 2005; Krcmar & Kean, 2005; Weaver, 1991, 2003; Weaver, Brosius, & Mundorf, 1993). When it comes to television watching, personality variables predict these media preferences better than demographic variables. For example, type of networks watched and the amount of hours spent watching TV can be predicted better from personality traits (Sandy and Gosling, 2013). More specifically, researchers have found that Extraversion is positively related to media use: for instance, extraverts prefer comedy movies (Weaver, 1991). Neuroticism has also been proven to predict tendencies of media use, such as consuming mass media as a form of escape or distraction (Shim & Paul, 2007).

Additionally, preference for different genres of television programs can be predicted by different personality traits. For example, people who have aggressive personalities are more likely to prefer violent television content. Similarly, personality traits predict levels of attention to different television program types: individuals high on Neuroticism are more likely to pay attention to soap operas, talk shows, and crime dramas than low neurotics, and high extraverts are more likely to pay attention to reality programs on television than low extraverts.

Personality and video games preferences

Research into personality and video games focuses on the relationship between gamers' personalities and their propensity and reasons to play video games, as well as their "gamer personality".

Przybylski (2012) found that individuals are motivated to play games in order to experience their "ideal self characteristics"; in other words, when people feel that who they are is significantly different from their ideal self, they compensate for this gap by playing video games that make them feel more like an idealised version of themselves. Other researchers have focused on understanding the type of gamers people are and the relationship between their personalities and gaming preferences. For example, Zamitto (2001) found that individuals who are high on Neuroticism and Extraversion have higher tendencies to play action shooting and fighting games, whereas individuals who are high on Openness prefer the simulation and artificial intelligence genre. The study also showed that high levels of Extraversion combined with low levels of Openness and Agreeableness are related to an increase in the likelihood of playing video games online.

Personality and fandom

Fan culture and popular media are of high interest to many researchers as well as authors and have been directly related to psychological antecedents and predictors. Researchers have studied the psychology of individuals and their favourite characters, whether sports athletes, media personalities or celebrity figures. This relationship between media characters and audience members is usually referred to as a parasocial one (term coined by Horton and Wohl in 1956): a one-sided relationship established by television viewers who feel a special connection with the characters (Rubin & McHugh, 1987, Eyal & Cohen, 2006).

Parasocial relationships are influenced by psychological factors such as perceived similarity, perceived realism (Rubin & Perse, 1987) and personality traits. In the case of sports fandom, Neuroticism and Agreeableness were significant predictors of feeling empathetic towards favourite athletes (Sun, 2010). Another research based on sports celebrities has shown that

interest in sports spectatorship as well as materialism are both positive predictors of parasocial relationships with characters (Sun & Wu, 2012). On the other hand, self-esteem is negatively associated with parasocial relationships, as individuals who have high self-esteem seek to enhance it, but those who experience low self-esteem want to make up for their lack of it (Tice, 1993) through following and living vicariously through these characters.

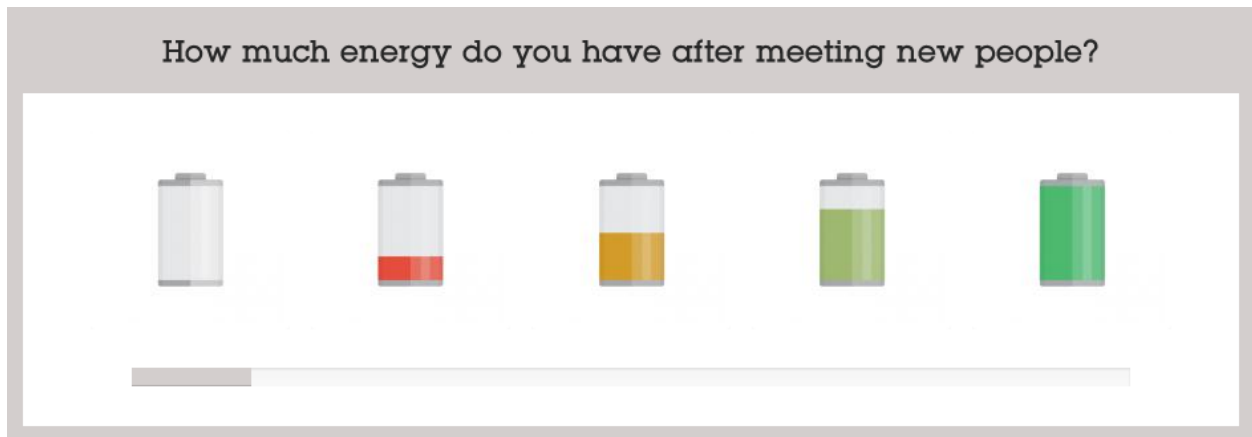
Celebrity worship has been of interest to various researchers over the years and was found to be predicted by personality, attitudes and behaviours. McCutcheon, Lange, and Houran (2002) have developed a theoretical model of celebrity worship, namely the “absorption-addiction” model that explains parasocial relationships. The social aspect of these relationships is reflected by the “entertainment-social” type of celebrity worship and is predicted by Extraversion. High levels of Neuroticism predict the “intense-personal” type of celebrity worship, or in other words, the psychological absorption with a celebrity.

In summary, personality can be used to effectively predict consumer behaviour, and specifically online and media preferences. In the following section, we describe an innovative image-based personality test developed in-house, which has been used to profile consumers at scale. The personality profiles collected are then used to optimise targeting of ad campaigns and personalised messages, among other solutions.

An image-based personality test

VisualDNA has developed a visual questionnaire that uses images in order to measure personality. Visual questionnaires offer a fun, interactive and gamified experience, which is crucial in commercial settings. We have measured highly positive user engagement; for example, half of our traffic is viral, and completion rates range from 70% to 80%.

Visual questions are intuitive to answer. Serious and emotionally charged questions can be asked using humour and euphemisms, without compromising the clarity of the option meaning. Each question is designed to facilitate understanding of a distinct personality trait, and is usually composed of a range of possible answers. For example, the question “How much energy do you have after meeting new people?” was designed to measure Extraversion, with illustrations of batteries merely replacing the standard Likert scale.



However, in the next example: "In general, how do you think people treat others?"; the use of images is more sophisticated, and enables us to include a variety of positive and negative feelings portrayed through the valence of the images, while enhancing the ease of identification with the chosen answer.

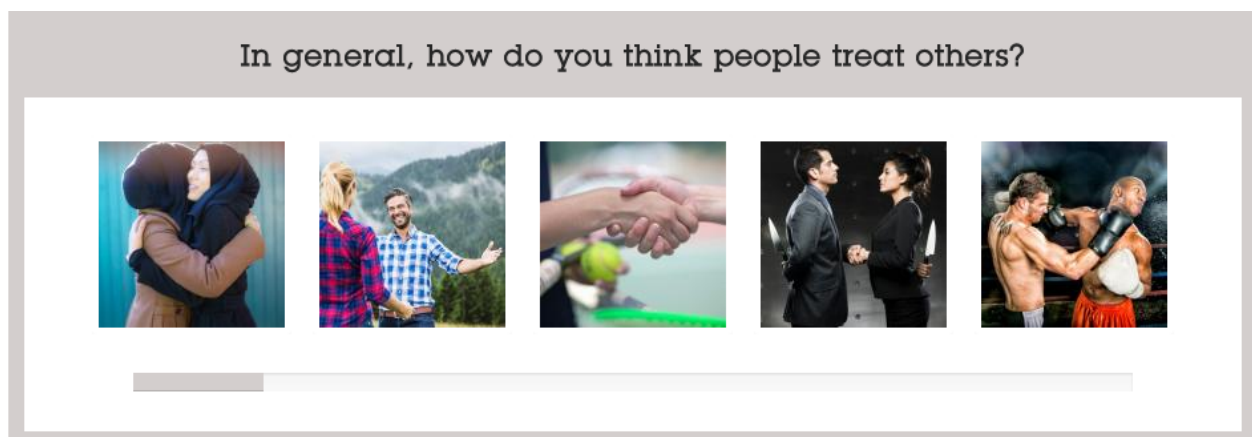


Image scale validation

A large-scale validation test was carried out according to academic and industry standard verification protocols and which largely concluded that VisualDNA's image-based assessments are a robust measure of personality.

A study was conducted to measure the correlation of our new scale comprised of 32 image questions, with an established scale of the Big Five personality dimensions taken from the International Personality Item Pool (IPIP, Goldberg, 1992, Goldberg, 1999; Goldberg, Johnson, Eber, Hogan, Ashton, Cloninger & Gough, 2006). This method was undertaken to ensure convergent validity of our scale. Correlations of 0.4 - 0.7 imply a strong convergent validity, while correlations above 0.7 signify very strong convergence (Chamorro-Premuzic &

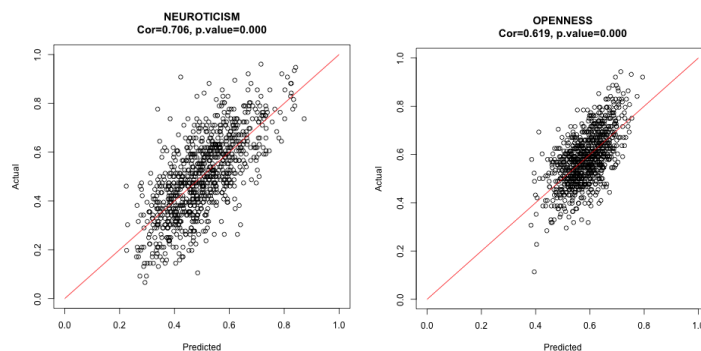
Ahmetoglu, 2013), and are rarely achieved even in test-retest reliability tests of personality scales.

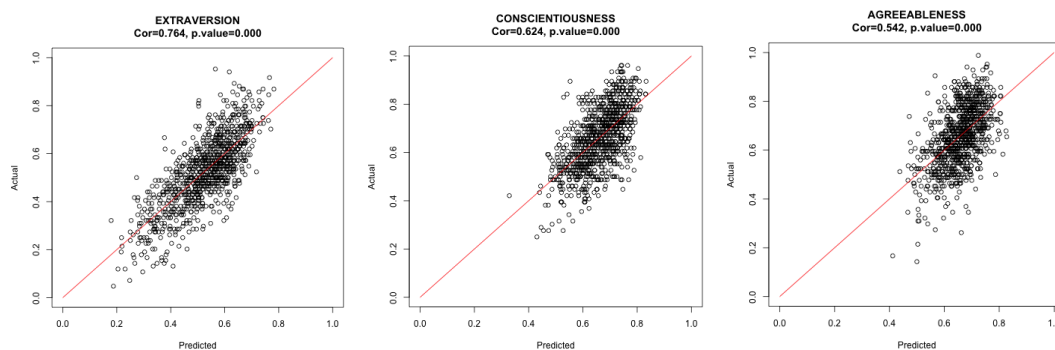
A demographically balanced sample of 1,000 paid participants was recruited for the study through a third-party market research company. After identifying missing data and filtering out the incomplete/invalid cases, data were analysed from 980 participants. Each of the participants completed VisualDNA's image-based scale as well as the IPIP scale.

In order to establish a reproducible relationship, we used machine learning tools, rather than merely correlation. Regression models were trained with 10-fold cross validation. The reported correlations were calculated based on predicted scores, and therefore provide a conservative measure in comparison to academic literature standards.

We have observed high correlation with all Big Five dimensions, all significant at the $p < 0.01$ level:

Openness	0.601
Conscientiousness	0.622
Extraversion	0.747
Agreeableness	0.561
Neuroticism	0.711





The newly developed image scale is therefore a reliable measurement tool of the Big Five personality dimensions. Even further support and evidence for the accuracy of the tool is gained from the successful prediction of commercial outcomes through applications in business. Selected case studies will be described in the following sections.

User acquisition and mitigation of selection biases

In the previous section we have demonstrated the scientific validity of the VisualDNA scale when compared with an established text based scale. In this section we explain our user acquisition strategy and how we ensure that we use a representative sample of the overall population.

As mentioned above, half of the users discover our product via viral traffic. The other half are acquired online - either via generic ads or ads that target specific demographic audience. The latter method is used in order to compensate for the inherent bias in viral traffic. We then stratify the data to achieve a demographically representative sample; stratification criteria are adjusted for each market.

This has proven to be sufficient to ensure that we have a representative sample of users. First, in a study conducted in the UK, we selected 14 websites with more than 1M users. We compared our estimated age and gender breakdown for each of the sites with *Comscore* estimates. On average 90% of our estimates agree to a 5% level.

Second, we have demonstrated in the previous section that our personality tests are valid in comparison with previously established and unbiased personality measures.

Finally, as we will demonstrate in the next section, our data has proven both to scale well and to provide a demonstrable uplift to commercial campaigns. This is another indirect indication for the value of our data.

While stratification is a useful method of acquiring a representative sample, it may significantly increase the cost of acquisition for low-engagement segments. Therefore, we are improving our messaging and proposition to different population segments continually. For example, historically, mature men were less likely to interact with our products. Through rigorous testing of a large number of propositions, we discovered the optimal ways to engage with this audience, reduced the cost of acquisition 10 fold, to below our run-of-network cost.

Similar methodology could be utilised with any low engagement audience, by creating tailored propositions and using our inferred profiles for targeting.

Obtaining scale via behavioural inference

VisualDNA provides audience insights to hundreds of publishers and e-commerce sites around the globe. As a result, our partners are able to better target audiences both within their website and around the web. This is possible through a network of partnerships, which enables the VisualDNA Audience Analytics Tag to be deployed on major websites across the Internet. This allows us to assign a cookie to every one of the websites' visitors, and via that cookie, we are able to track users and aggregate their browsing behaviour. The data collected in this manner is then used by our inference algorithms to identify similar behavioural patterns and assign highly accurate inferred profiles to our 300M strong user pool.

VisualDNA data is available to our partners and clients via a number of integrations ranging from DSP platforms such as *DoubleClick*, *MediaMatch* and *AppNexus*, to email service providers and onsite optimisation tools such as *Responsys* and *Monetate*. VisualDNA data can also fuel search campaigns thanks to our integration with *AdWords* as well as provide additional insight layer on top of *Adobe's SiteCatalyst* and *Google's Universal Analytics* dashboards.

The predictive power of VisualDNA's psychographic data - Case Studies

VisualDNA helps a vast number of clients and partners across the industry to understand their users using our rich psychographic data. Psychographics, a term coined by Demby in 1965 (reviewed in Demby, 1994), are the combination of demographic and psychological variables

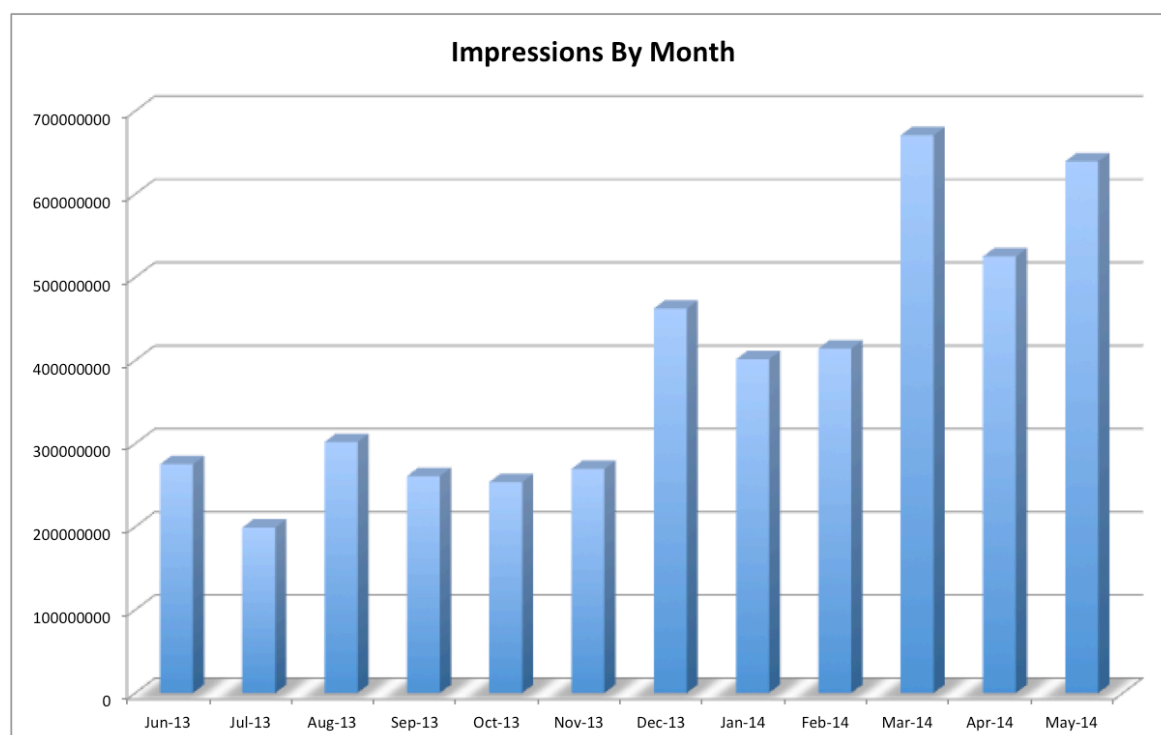
such as personality traits, values, motivations and attitudes, and which are used in the field of market segmentation for the purpose of understanding consumer behaviour and enhancing business and marketing strategies.

The additional layer of insight provided by VisualDNA's psychographic, brand, intent and lifestyle data helps publishers to better monetise their audience; ecommerce websites to identify their high value customers and target them efficiently; and marketing agencies to reach out to online audience matching a brand brief.

The increasing demand and use of data for online targeting is apparent from the below graph which plots the number of ad impressions served utilising VisualDNA data in last 12 months.

Our publisher network is more than 100 websites strong and includes likes of *Trinity Mirror* and the *Telegraph* in the UK as well as *Gumtree*, *TimeOut* and *Wikia* internationally. VisualDNA data powers display campaigns of brands such as *British Airways*, *L'Oreal* and *IKEA* and helps optimise email and search campaigns as well as on-site user journey for ecommerce retailers like *Topshop*, *feelunique.com* and *Waitrose*.

Following, we present three case studies in order to further demonstrate the validity of our data in commercial solutions.



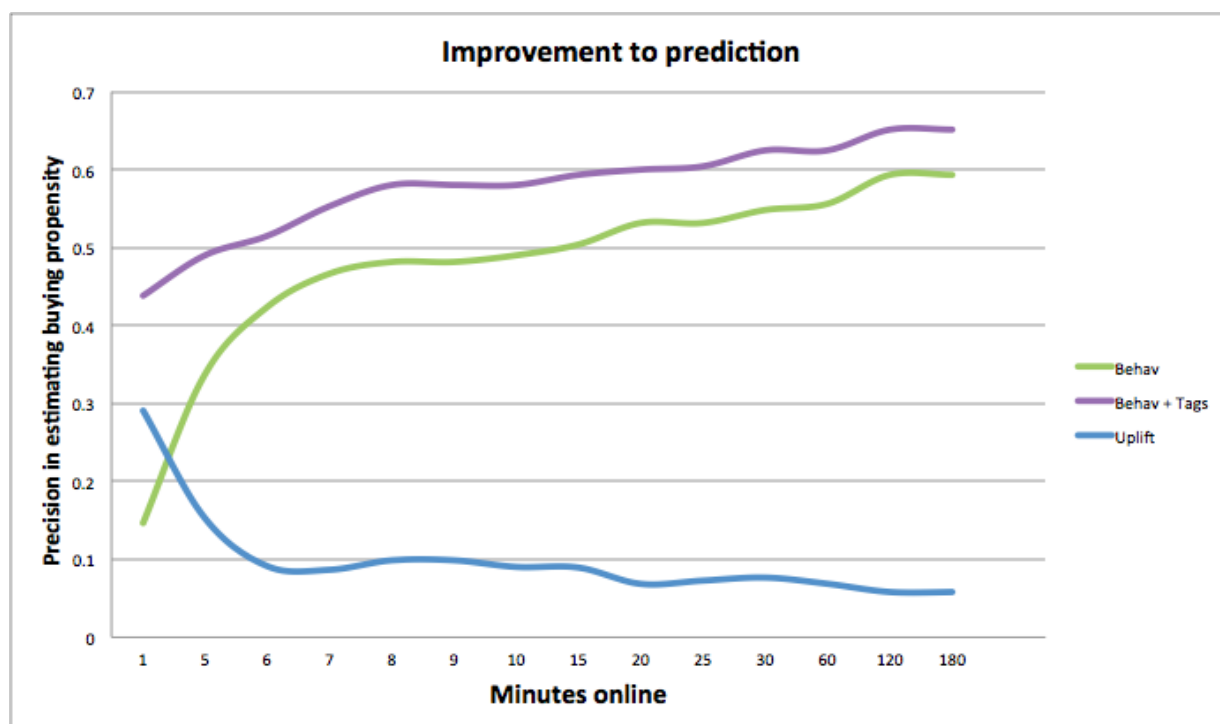
Case study I - Identifying profitable customers for A Client

VisualDNA™

The client was interested at finding out which of the customers landing on their website are the most valuable, so user journeys can be tailored by providing relevant content to them depending on their 'mode' - browsing vs. buying.

Using VisualDNA's psychographic data improved the prediction accuracy of users' propensity to purchase within the first minute of their visit on the website by nearly 300%, compared to using the 1st party data alone.

The following graph demonstrates the difference between buying propensity prediction precision of the first party behavioural data (green), and the first party behavioural data combined with VisualDNA's psychographic data (purple), for visitors of the client's website within their browsing session.



Case study II - Conversion rate increased by 700%

With a different client, a pay-wall provider for large European and US publishers, VisualDNA was asked to help to re-engage and convert users who unsubscribed from the paid service.

VisualDNA used website tracking to identify profiles and behaviours of subscribed users. This information was used to fuel our look-alike model which identified a custom audiences of potential publishers, and their likelihood to sign up. Email marketing campaigns were then targeted at those most likely to sign up. Emails were also sent to those least likely to sign up, and to a random sample, to provide a reference.

The email campaigns delivered sign up rates of 1.59% for users from the top of the list (most likely to subscribe), 0.52% for the random audience sample and 0.22% for users from the bottom of the list (least likely to subscribe). The top of the list audience outperformed the bottom of the audience list by 700%.

Case study III - Reducing cost per acquisition by 65%

Working with an international beauty brand and their agency, VisualDNA was tasked with optimising campaign performance for their new mascara product launch campaign.

Using VisualDNA psychographic and behavioural data, we developed bespoke audience segmentation which enabled the brand to focus its media spend on more effective target audiences for a six week targeted display campaign.

VisualDNA campaigns significantly outperformed five other competing campaigns performed in parallel (3 data, 1 site filter list, 1 private marketplace) and reduced customer acquisition cost by 65-40%.

Conclusion

The value of assessing personality is tremendous in the prediction of behaviour in general, and consumer behaviour specifically, encompassing domains ranging from brands, media, digital behaviour, and general entertainment. VisualDNA has developed a proven methodology to measure personality through its image-based tests and is able in turn to provide accurate and valuable insights to businesses that aim to understand their customers and better target their products and services to their different audiences.

References

Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: a meta-analysis. *Personnel psychology*, 44(1), 1-26.

Barry, B., & Friedman, R. A. (1998). Bargainer characteristics in distributive and integrative negotiation. *Journal of Personality and Social Psychology*, 74(2), 345.

Branaghan, R. J., & Hildebrand, E. A. (2011). Brand personality, self-congruity, and preference: A knowledge structures approach. *Journal of Consumer Behaviour*, 10(5), 304-312.

Chamorro-Premuzic, T. & Ahmetoglu, G. (2013). *Personality 101*, NY:Springer

Chamorro-Premuzic, T., & Furnham, A. (2003). Personality predicts academic performance: Evidence from two longitudinal university samples. *Journal of Research in Personality*, 37(4), 319-338.

Chamorro-Premuzic, T., Von Stumm, S., & Furnham, A. (Eds.). (2011). *The Wiley-Blackwell handbook of individual differences* (Vol. 3). John Wiley & Sons.

Chausson, O. (2010). Who watches what?: assessing the impact of gender and personality on film preferences.

Costa, P. T., Jr., & McCrae, R. R. (1992). "Four ways five factors are not basic": Reply. *Personality and Individual Differences*, 13, 861- 865.

Costa, P. T., Jr., & McCrae, R. R. (1995). Solid ground in the wetlands of personality: A reply to Block. *Psychological Bulletin*, 117, 216- 220.

Cury, F., Elliot, A. J., Da Fonseca, D., & Moller, A. C. (2006). The social-cognitive model of achievement motivation and the 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology*, 90 (4), 666-679.

Digman, J.M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41, 417-440.

Donnelly, G., Iyer, R., & Howell, R. T. (2012). The Big Five personality traits, material values, and financial well-being of self-described money managers. *Journal of Economic Psychology*, 33, 1129-1142

Eyal, K., & Cohen, J. (2006). When good friends say goodbye: A parasocial breakup study. *Journal of Broadcasting & Electronic Media*, 50(3), 502-523.

Goldberg, L. R. (1992). The development of markers for the Big Five factor structure. *Psychological Assessment*, 4, 26-42.

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe*, Vol. 7 (pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. C. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality*, 40, 84-96.

Guadagno, R. E., Okdie, B. M., & Eno, C. A. (2008). Who blogs? Personality predictors of blogging. *Computers in Human Behavior*, 24(5), 1993-2004.

Hampson, S. E. (1992). 'The emergence of personality: a broader context for biological perspectives'. In: Gale, A. and Eysenck, M. W. (Eds), *Handbook of Individual Differences: Biological Perspectives*, pp. 115-139, Wiley, New York.

Herabadi, A. G. (2003). *Buying impulses: A study on impulsive consumption*. [SI: sn].

Horton, D., & Wohl, R. R. (1956). Mass communication and para-social interaction: Observations on intimacy at a distance. *Psychiatry*, 19(3), 215-229.

Huang, H. H., Mitchell, V., & Rosenbaum-Elliott, R. (2012). Are Consumer and Brand Personalities the Same? *Psychology & Marketing*, 29(5), 334-349.

Johnson, Tricia, and Julianne Attmann (2009). "Compulsive buying in a product specific context: clothing." *Journal of fashion Marketing and Management* 13.3 (2009): 394-405.

Kosinski, M., Stillwell, D., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. *Proceedings of the National Academy of Sciences*, 110(15), 5802-5805.

Kosinski, M., Stillwell, D., Kohli, P., Bachrach, Y., & Graepel, T. (2012). Personality and website choice.

Lane, W., & Manner, C. (2011). The impact of personality traits on smartphone ownership and use. *International Journal of Business and Social Science*, 2(17), 22-28.

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of personality*, 60(2), 175-215.

McCutcheon, L. E., Lange, R., & Houran, J. (2002). Conceptualization and measurement of celebrity worship. *British Journal of Psychology*, 93(1), 67-87.

McElroy, T., & Dowd, K. (2007). Susceptibility to anchoring effects: How openness-to-experience influences responses to anchoring cues. *Judgment and Decision Making*, 2(1), 48-53.

Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factors structure in peer nomination personality ratings. *Journal of Abnormal and Social Psychology*, 66(6), 574-583.

Ozer, D. J., & Benet-Martinez, V. (2006). Personality and the prediction of consequential outcomes. *Annual Review of Psychology*, 57, 401-421.

Przybylski, A., Weinstein, N., Murayama, K., Lynch, M. & Ryan, R. (2012). The Ideal Self At Play: The Appeal of Video Games That Let You Be All You Can Be. *Psychological Science*, 23(1) 69-76.

Rentfrow, P. J., & Gosling, S. D. (2003). The do re mi's of everyday life: the structure and personality correlates of music preferences. *Journal of personality and social psychology*, 84(6), 1236.

Roberts, B. W., & Robins, R. W. (2000). Broad dispositions, broad aspirations: The intersection of personality traits and major life goals. *Personality and Social Psychology Bulletin*, 26(10), 1284-1296.

Rubin, R. B., & McHugh, M. P. (1987). Development of parasocial interaction relationships.

- Sandy, C. J., Gosling, S. D., & Durant, J. (2013). Predicting consumer behavior and media preferences: The comparative validity of personality traits and demographic variables. *Psychology & Marketing*, 30(11), 937-949.
- Shim, J. W., & Paul, B. (2007). Effects of personality types on the use of television genre. *Journal of Broadcasting & Electronic Media*, 51(2), 287-304.
- Sun, T. (2010). Antecedents and consequences of parasocial interaction with sport athletes and identification with sport teams. *Journal of Sport Behavior*, 33(2), 194-217.
- Sun, T., & Wu, G. (2012). Influence of personality traits on parasocial relationship with sports celebrities: A hierarchical approach. *Journal of Consumer Behaviour*, 11(2), 136-146.
- Tupes, E. C., & Christal, R. E. (1961). Recurrent personality factors based on trait ratings (Technical Report No. 61-97). Lackland Air Force Base: USAF ASD Technical Report.
- Van Ness, K., Hord, E., Keith, V., Urecki, C., Pena, J., Hurst, K., Buchholz, C., Fujimura, L., & Smith, R. (2013). The relationship between personality and film preferences.
- Vigneron, F., & Johnson, L. W. (1999). A review and a conceptual framework of prestige-seeking consumer behavior. *Academy of Marketing Science Review*, 1(1), 1-15.
- Weiss, A., Bates, T. C., & Luciano, M. (2008). Happiness is a personal(ity) thing: The genetics of personality and well-being in a representative sample. *Psychological Science*, 19, 205-210.
- Zammitto, V. L. (2010). Gamers' personality and their gaming preferences (Doctoral dissertation, Communication, Art & Technology: School of Interactive Arts and Technology).