

Designing with Meaningful Data

Deep personalisation in the air travel context

Yuan, Mengqi; Price, Rebecca; van Erp, Jeroen; Osorio Socha, Jorge Andrés

DOI

[10.21606/dma.2018.287](https://doi.org/10.21606/dma.2018.287)

Publication date

2018

Document Version

Final published version

Published in

Proceedings of DRS 2018

Citation (APA)

Yuan, M., Price, R., van Erp, J., & Osorio Socha, J. A. (2018). Designing with Meaningful Data: Deep personalisation in the air travel context. In C. Storni, K. Leahy, M. McMahon, P. Lloyd, & E. Bohemia (Eds.), *Proceedings of DRS 2018* (pp. 1440-1454). (Proceedings of DRS; Vol. 4). Design Research Society. <https://doi.org/10.21606/dma.2018.287>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

Designing with meaningful data: *Deep personalisation* in the air travel context

YUAN Mengqi^{a,b}; PRICE Rebecca^b, van ERP Jeroen^{b,c}, SOCHA Jorge Andres Osorio^d

^a Alibaba Group, China

^b Delft University of Technology, Netherlands

^c Fabrique, Netherlands

^d AirlineX, Netherlands

* Corresponding author e-mail: r.a.price@tudelft.nl
doi: 10.21606/dma.2017.287

Data and artificial intelligence (AI) are revolutionising the way customers interface with organisations and vice versa. However, there is limited knowledge regarding how data and AI are used as material during the design process. It is to this practice-research gap that this paper responds, by providing practical insight into a project between a Dutch airline, named *AirlineX* for the purpose of this paper, and a university-based design team. The project led to the development of a principle for personality-driven design that deeply personalises digital touchpoints within AirlineX's operations. This principle is informed by 'big five' personality theory from the field of psychology. Further, a framework for incorporating AI and data as meaningful subject matter into the design process is presented. This framework assists organisations to develop dialogue with customers beyond the purchase point through personal data, representing a democratisation of the traditional business to customer (B2C) perspective. The paper concludes with directions for future research that point toward the growing need for ethical discourse regarding technology, design and society.

Keywords: Personalisation, customer data, psychology, big five, use case

Introduction

Understanding a single customer's personality provides the opportunity to adapt to that individual's concerns and interests during (B2C) engagements. This is the essence of personalisation and the key to customer loyalty (Coelho & Henseler, 2012). Airlines connect with millions of passengers annually under strict regulations, thus the challenge to personalise operations faces difficulties. Where some airlines choose to compete on product leadership (for example Emirates), or cost leadership (for example Air Asia), other airlines choose to lead in the area of customer intimacy (AirlineX). This



This work is licensed under a [Creative Commons Attribution-NonCommercial-Share Alike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).
<https://creativecommons.org/licenses/by-nc-sa/4.0/>

strategy entails emphasis on the delivery of excellent customer experience through offline and online B2C interactions. However, as customer expectations rise in this digital age, so must organisations consider deepening the possibilities of personalisation.

Like many organisations, AirlineX views data and AI as potential opportunities to enrich their relationship with customers. But like many organisations, an all too common challenge is encountered; how to incorporate seemingly limitless technologies into operations in a meaningful way? A technology-push into the market carries the risk of failed adoption (Verganti, 2009). This practical challenge carries great relevance and significance to the design research community – as AI and data are becoming increasingly common subject matter in this digital age. Therefore, the purpose of this paper is to explore AI and data as the subject matter of design by presenting a research through design project titled *deep personalisation*. The project occurred over a period of eight months and led to the realisation of a proof-of-concept for AirlineX which will be being scaled across current operations.

The paper will now proceed as follows; first establishing the concept of data, AI, and the big five personality theory as core content of the paper. Second, the design project is introduced. Emphasis will be placed on how data collection and analysis via AI was made meaningful, by incorporating the big five personality theory. At this point, the paper will present a set of personality-driven design principles that guided humanising data and subsequent ideation within the project. Third, a discussion will occur, with reflection upon the strengths and weaknesses of the project taking place. The paper concludes with implications for practitioners and academics, and guidance for future research. This paper contributes novel knowledge regarding the integration of AI and data into the design process via personality-driven design as both a guiding principle and set of actionable tools.

Data and AI

Design-led organisations also outperform peers by identifying and leveraging latent needs (Rae, 2016). Data-driven organisations are also effective performers (Redman, 2013). Data is information that represents an event – for example the number of heart beats a minute can be represented as 60 beats/minute; or the number of times a product is sold, 78.29 million iPhones in Q1 of 2017 (Apple, 2017). This data is stored in raw form in a database. However, the sheer scale of *data* (drawn from online behaviour) determines that there is no immediate action that can be planned or executed after engaging with a database. For example, Wal-Mart adds a billion rows of point of sale data (POS) every day with rows relating to product type, location of purchase, time of purchase and so on (Menon & Sarker, 2016). However, what conceivable action would a manager take when viewing a billion new rows of sales data each day.

Data analysis provides a gateway to action. Data that is analysed can support strategic and operational decisions. AI¹ is a form of computing whereby the machine learns overtime based on feedback from the user and the broader system. Instead of a human entering an algorithm, the machine learns from available data and writes its own algorithms based on patterns and insights. The more data processed, the more accurate the machine can become in analysis and prediction. In such an arrangement, AI is the enabling cognition for processing data like that of Wal-Mart, who are now able to predict based on POS data when a consumer is likely to have a mid-life crisis (Menon & Sarker, 2016). There is possibility in near future that AI will also extend to abductive reasoning – the potential to creative leap. For the time being, AI provides a black box of tools, ranging from descriptive to predictive analysis (McKinsey Global Institute, 2017). The role designers play in ensuring there is beneficial translation of technologies of this magnitude into valuable products and services is yet to be fully determined.

¹ There are two forms of AI. Weak AI acts upon and is bound by the rules imposed on it by the user. Strong AI is 'born' and grows like a human through autonomous learning (UC Berkeley, 2017).

The 'Big Five' Theory as Gateway to Action

In the English language, more than 15,000 words describe personality (Principles of Management, 2013). Goldberg (1990) identifies that many different themes point to a single dimension of personality and so formulated five main dimensions of personality; openness, conscientiousness, extroversion, neuroticism and agreeableness. The big five theory does not imply that personality differences can be reduced to only five traits. Rather, these five dimensions represent personality at the broadest level of abstraction, and each dimension summarises a large number of distinct, more specific personality characteristics. A basic description of each dimension is provided in Table 1. Currently, the *big five personality theory* is the most validated and commonly used personality model in research (McRae & Torbert, 2016). For example, research has investigated the big five in the different disciplines; economics (Borghans, Duckworth, Heckman, & Weel, 2006); education (Swanberg & Martinsen, 2010); health (Smith & Williams, 1992), and; social resources (Headey, Muffels, & Wagner, 2010). These studies sought to advance each discipline through application of the big five theory.

In the context of this study, the big five personality theory offers a criteria through which to analyse a POS database. For example the attributes of frequent flyers of AirlineX can be analysed to determine personal characteristics that may then guide the design of services and products. Similarly, in research by Kosinki, Stillwell and Graepel (2013), Facebook likes were analysed using AI to determine personality traits and attributes of individual users. The results were that AI was able to describe someone's personality to a higher degree of accuracy than that of family members, colleagues and friends – but not spouses. Further, this principle has been used to increase the voter turnout in the 2017 US elections via platforms such as Cambridge Analytica and Strategic Communication Laboratories Group, UK. However, there is no precedent for similar use of data, AI and the big five theory in enriching B2C interactions – and more specifically the influence of these concepts within the design process. This is the practice research gap to which this paper responds.

Table 1 An alternative 'description of personality' – (Goldberg, 1990)

Trait	Description
Openness	Curious, original, intellectual, creative and open to new ideas
Conscientiousness	Organised, systematic, punctual, achievement orientated and dependable
Extraversion	Outgoing, talkative, sociable and enjoys being in social situations
Agreeableness	Affable, tolerant, sensitive, trusting, kind and warm
Neuroticism	Anxious, irritable, temperamental and moody

Methodology: Research through Design

To address the aforementioned practice-research gap, a research through design approach (Stappers & Giaccardi, 2017) is applied to report upon a design project that occurred over a period of eight months. The project involved the partnership between AirlineX and a design team based at the Delft University of Technology. The brief for the project was formulated by the client, AirlineX and challenged the design team to address the following line of inquiry: *how can customer intimacy be enhanced using data and AI?* A research through design methodology involving six design cycles was undertaken to respond to the brief.

Design Cycle 1: Generative Workshops to Reframe the 'Big Five' in the Aviation Context

The first moment in the design project brought together participants from AirlineX and the design team. Three generative design-led workshops (3 hours in duration each) were completed in order to reframe the big five theory to the travel context as a set of expected behaviours by passengers (See Figure 1). Literature was used to inform these workshops, for example, participants were informed how recent research showed that complimenting high conscientiousness people for their accuracy,

completeness, adherence to procedures, and attention to detail positively contributed to their well-being (Rothmann & Coetzer, 2003). Similar opportunities were identified that were specifically related to the travel context, for example - passengers who score high in conscientiousness might expect appreciation for checking-in on time. Two themes from the workshops were identified. First, identifying a set of needs was vital. Second, the resulting interaction quality to meet those needs was a further means for personalisation, drawing similarities to the product focused work of Desmet, Nicolas and Schoormans (2008). These insights were carried into the following design cycle.



Figure 1. Generative workshop to reframe 'big five' into aviation context as passenger needs and interests

Design Cycle 2: Exploring personality related concerns and interests with passengers

The objective of this design cycle was to explore personality-based concerns and interests established during cycle one with passengers in context. Eleven (11) AirlineX passengers who were waiting for their flights at the X Gates² were selected in random order as participants. The participants were five male and six female of nationalities from Denmark, US, Canada, Scotland, NL and Turkey. Ages varied from 20 to 50 years of age. A set of design interventions were tested with passengers to explore the potential relationship between personality and travel preferences (Price & Wrigley, 2016). These interventions were based on assumptions formulated in design cycle 1 – for example the following assumption was evaluated; passengers with low conscientiousness tend to delay the preparation process and forget to check details. Another example of an assumption tested was that passengers of high openness would like to explore the airport while waiting for their flight. After the passenger answered ten questions to determine personality (see Figure 2), interventions were then introduced using a tablet to demonstrate potential services and products that explored the stated assumptions. These interventions took between 20 and 30 minutes per passenger with feedback recorded upon consent from passengers. These interventions found that personality indeed plays a role in passenger's preferences, however, there are additional factors such as trip goal and mood that influence experience. Furthermore, passengers tended to oppose change that forced certain behaviours. Any solution that captures customer data would need to provide an opt-in for the passenger to ensure they have the ultimate right to have services customised based on personal data.

² X Gates is a fully operational airport gate at Amsterdam Airport Schiphol where AirlineX conduct innovation related prototyping with real passengers



Figure 2. An intervention example tested at X Gates. Personalised bag tags to help encourage high openness, high extrovert passengers to meet

Design Cycle 3: Developing the Personality-Driven Design Principle

Based on the insights obtained from design cycle 1 and 2, the main concerns of passengers with particular personality traits, needs and interests were summarised. This summary took form through a set of physical cards that visualized a design principle (see Figure 3). Each card contained the type of passenger based on personality, their concerns, interests, needs and the interaction quality desired. Furthermore, every trait started with a symbolic statement that was encountered when working with passengers in design cycle 2. These cards together with a set of design requirements which were translated from the brief were used to develop the personality-driven design principle.

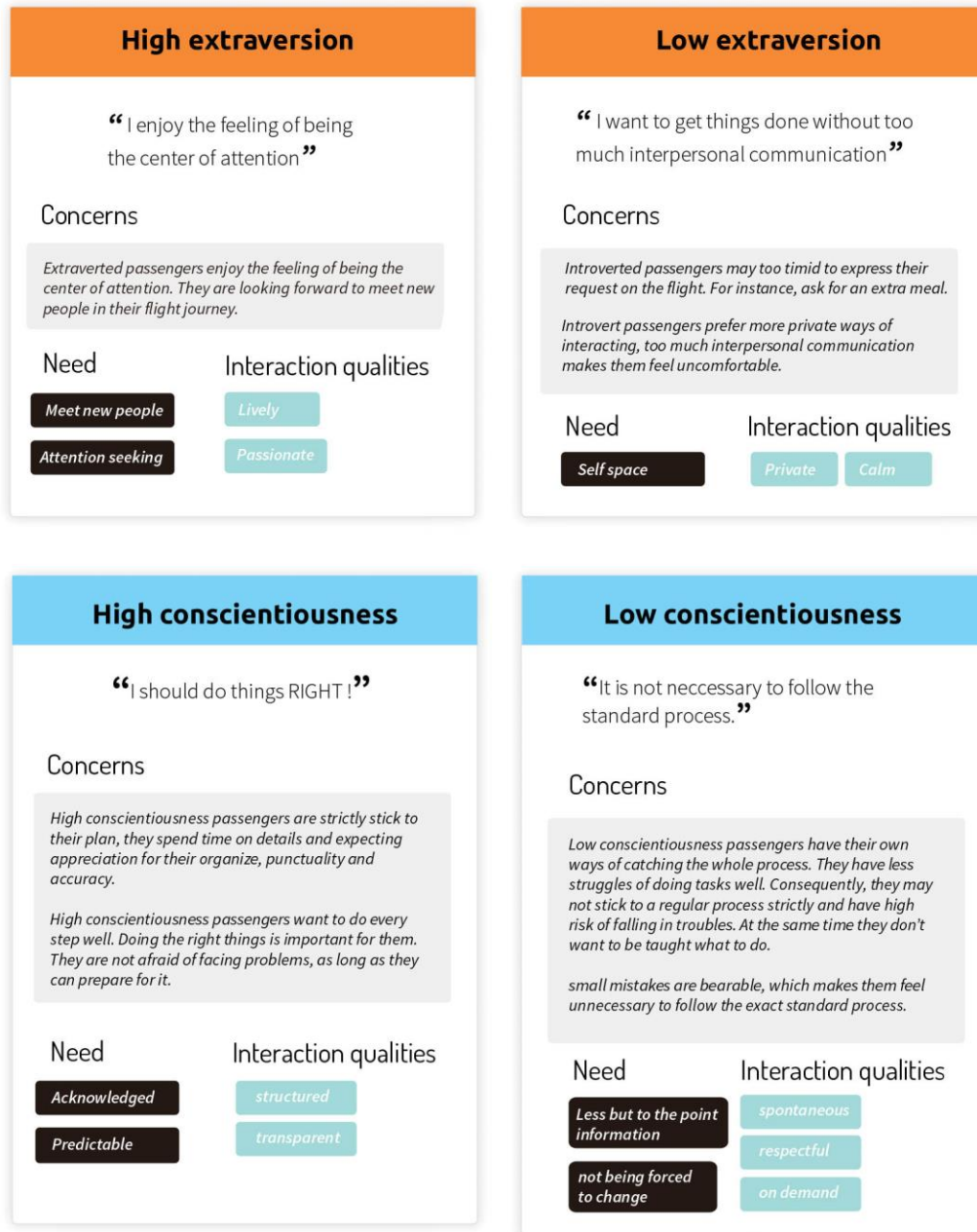


Figure 3. Personality-driven-design principle cards for extraversion and conscientiousness – a tool for designers – Available in larger size Appendix A and B

Design Cycle 4: Ideation via H2s Method

‘How to’ (H2s) is a design method that supports ideation (Boeijen, Daalhuizen & Zijlstra, 2014). In this case, the method was deployed to assist the design team to approach defined problems and opportunities informed by the earlier cycles of the design process. There were two phases within each H2 question, first to question the needs of a particular personality type, second to envision an ideal interaction quality based on personality characteristics. For instance, according to the personality-driven principle, people who score high in conscientiousness want to be appreciated for their preparation and punctuality. A H2 question can be reframed, ‘How to show appreciation to the high conscientious while they are making travel preparations?’ By answering this H2 question, new ideas were considered. The second set of H2 questions queried the desired interaction qualities. In this scenario, H2 questions can be reframed as, ‘How to show the destination information in a

structured way for people with high conscientiousness?’ Similarly, ‘How to show the destination information in a spontaneous way for people low in conscientiousness?’ By answering these H2 questions, new AirlineX services and products could be conceptualised.

Design Cycle 5: Designing a Use Case for AirlineX Flight Guide

To test the concept, the POS of was considered as an ideal scope for testing the concept. Flight Guide is an existing product in AirlineX that gives important flight information and possible relevant recommendations for passengers before a trip starts. Currently, the Flight Guide uses a rudimentary platform to convey information to passengers with no personalisation. By applying the personality-driven design principle – a set of tailored set of interfaces were proposed to the organisation. The concept begins with collecting new customer data related to personality type through ten questions designed to be playful (see figure 4 as an example). Based on the response to these questions, the approximate personality type of a customer could then be determined and catered to through the online touchpoints of AirlineX. This principle could be scaled across an operations, however, the design team chose to focus on online B2C interactions as a starting point. Figure 5 and 6 further communicate the type of personalisation conceptualised.



Figure 4. Example interface – Gathering data at POS. This customer data is then stored and analysed using AI to determine the personality of an individual passenger. Deeper personalisation of touchpoints can then be developed based on identified personality type



B. NEUROTICISM/2.2. SOCIAL MEDIA CHATTING

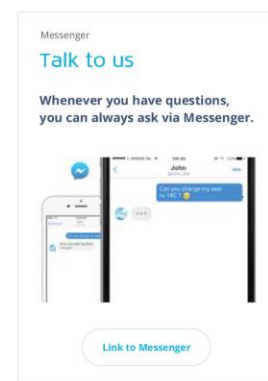
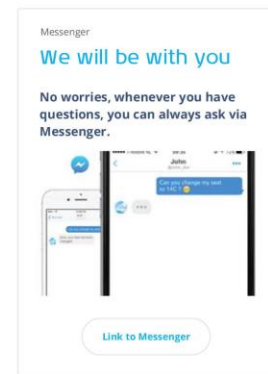


Figure 5. Example interface for passenger with a personality score indicating neuroticism. The airline will be 'with you' during your journey. Research shows that the computer can be an effective mediator people who are shy (Strizke, Nguyen & Durkin, 2004). Other touchpoints where the passenger interfaces with the airline can also be adapted to support the neurotic flyer – for example passengers can be guided through security by ground crew at unfamiliar airports

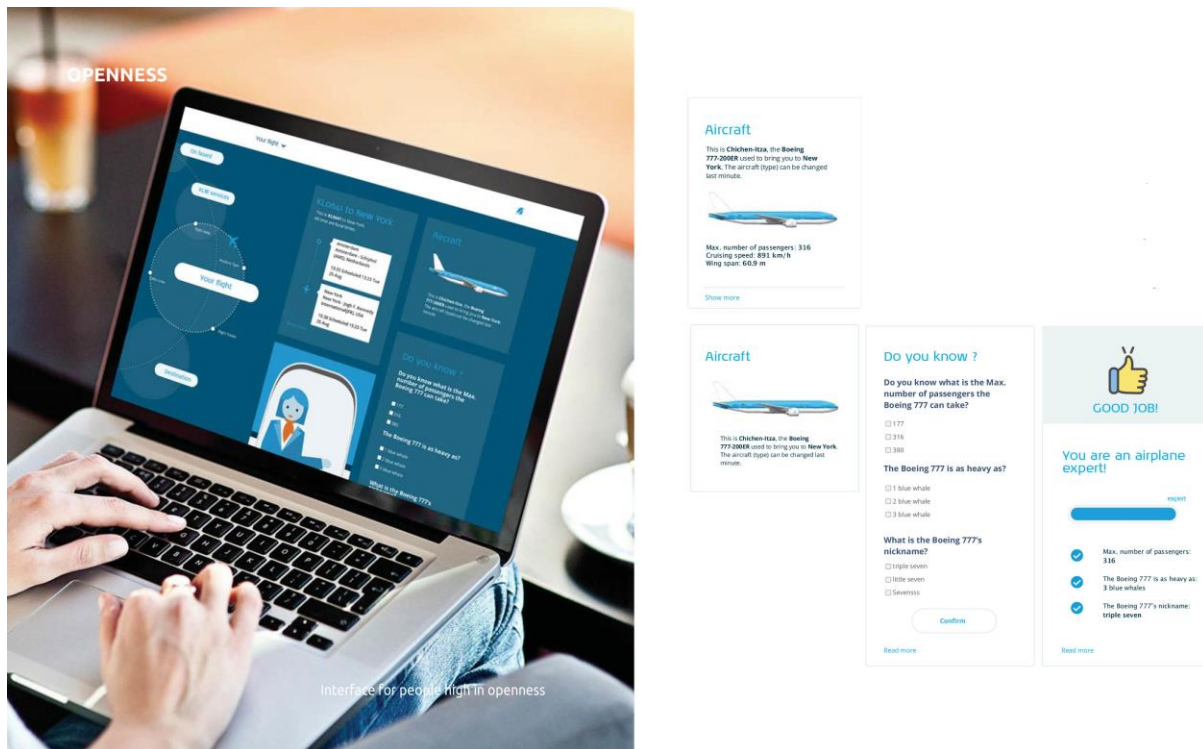


Figure 6. Example interface for passenger with a personality score indicating openness. The passenger is able to explore, learn new things about aviation and be rewarded. Other touchpoints where the passenger interfaces with the airline can also be adapted – for example a business class passenger could be served a surprise meal that contains their favourite ingredients or flavour.

Design Cycle 6: Evaluating the principle with real customers

The final design cycle of the project evaluated the concept with passengers. The evaluation approach involved 20 AirlineX passengers waiting at the X-Gates lounge at Amsterdam Airport Schiphol for departing flights. 20 semi-structured interviews were completed, each taking a duration of approximately 30 minutes. The evaluation began with ten personality-related questions that were used to determine an approximate personality type. There is a practicality-accuracy trade-off of using 20 questions only. Certain questionnaires to determine personality can be up to 60 questions long. In this instance, the questionnaire looked to identify strong indicative traits of personality only. Given the live environment, this is considered a limitation of working with the big-five theory and must be factored into future research.

Passengers were then involved in A-B testing of existing and new personality-driven Flight Guide services. Nine out of twenty passengers were high in conscientiousness and showed consistent preferences to the high conscientiousness-oriented interface design. For extraversion traits, five out of six of passengers high in extraversion appreciated the high extraversion-oriented welcoming banner. Extraversion played a role in passenger preferences. For Openness, twelve out of twenty passengers consistently responded positively to the personality specific version of Flight Guide. Openness also played a role in passengers' preferences. In conclusion, the personality-driven design of Flight Guide was positively received. According to the results, openness, extraversion and conscientiousness play a role in influencing preferences. Passengers were more likely to choose a design that matched with their personality. This result suggests that services taking personality into consideration can positively influence customer experience in air travel context.

Implementation

This paper only considered the design of Flight Guide, which is the primary digital channel of AirlineX. Opportunities to design based on personality at various touchpoints within the travel journey are being pursued in further design projects. However, based on the learning present within

this project, there are five notable design requirements that must be considered when attempting to design based on personality. These requirements are presented in Table 2.

Table 2. Design intervention details

Design requirement	Description
1. The personality-based interaction should not influence the satisfaction of basic needs	The fulfilment of the personality-oriented needs and preferences should not influence the fulfilment of the basic needs. For instance, people high in openness may prefer a more explorative way of viewing information. However, the fulfilment of this preference should not influence the information clarity, which is a basic need
2. The personality-based interaction for one customer should not influence the experience of other customers	People high in extraversion may tend to express their extraverted nature. Services for this group of people should not influence the experience of others who may be introverted or low in openness. Careful consideration of how these services are implemented is required
3. The goal of travel should be taken into account	According to the design practice results, passengers with high extraversion may look forward to meeting new people in their waiting time. But if he or she is traveling for a business purpose, the most important need while waiting would be a good place to work. Consequently, the trip goal should be taken into consideration while tailoring the service and product based on personality in this situation. Other factors, for instance, mood, and who you are traveling with may also influence the needs in a specific moment.
4. New interactions should also be able to reflect the brand image of the business	The personalised design should not lose the brand identity of the business which is represents
5. Support, rather than force change	Personality driven design should encourage behaviour that assists a customer to engage with a business – rather than force certain behaviours through exclusive design

Discussion

Making Data Meaningful

To scale this concept up, passenger data would be analysed, using an algorithm underpinning AI to determine the personality of AirlineX passengers based on all operational data. AI as a cognitive machine can then humanise customer data by determining the big five personality traits. This phase of analysis becomes the initial exploration witnessed in a design process – often through design methods such as persona design or observation. What AI and data provides is a mechanism to vastly scale the exploration capabilities of the designer. Consequently, the principle is a base, it is a starting point to consider a system that collects and translates data into meaningful design material. The design team can then ideate to develop unique and deeply personal brand experiences based on personality type. This is the essence of personality-driven design using data and AI as a design material. Further, through collection of customer data and subsequent adaption of services to the individual, a living dialogue between business and customer can be developed. A visualisation of this process is presented in Figure 7.

Combining the Strength of Designer and AI

Data-driven organisations are efficient performers (Redman, 2013). Design-led organisations also outperform peers by identifying and leveraging latent needs (Rae, 2016). When AI is paired with data of a person's digital trace (from social media for example), the machine will find correlations, identify patterns and make predictions of possible needs and preferences for future. AI when partnered with a principle for processing data is able to perform a form of exploration. The scale of this exploration is something that the designer is not able to mimic. Critically, what the designer can do is take the result of AI exploration and translate this into the design of products, services and

systems. In this case, we have shown that the designer asked AI to identify the personality traits of passengers in order to provide an opportunity for deeper personalisation of online AirlineX services. Therefore, AI offers a powerful design tool for the designer in a digital economy – particularly to allow designers to turn ubiquitous data into meaningful material for designing. For the time being, the designer will be able to direct AI, however, this may not always be the case. Therefore, the possibilities of AI and data must remain a prominent discourse of the design community.

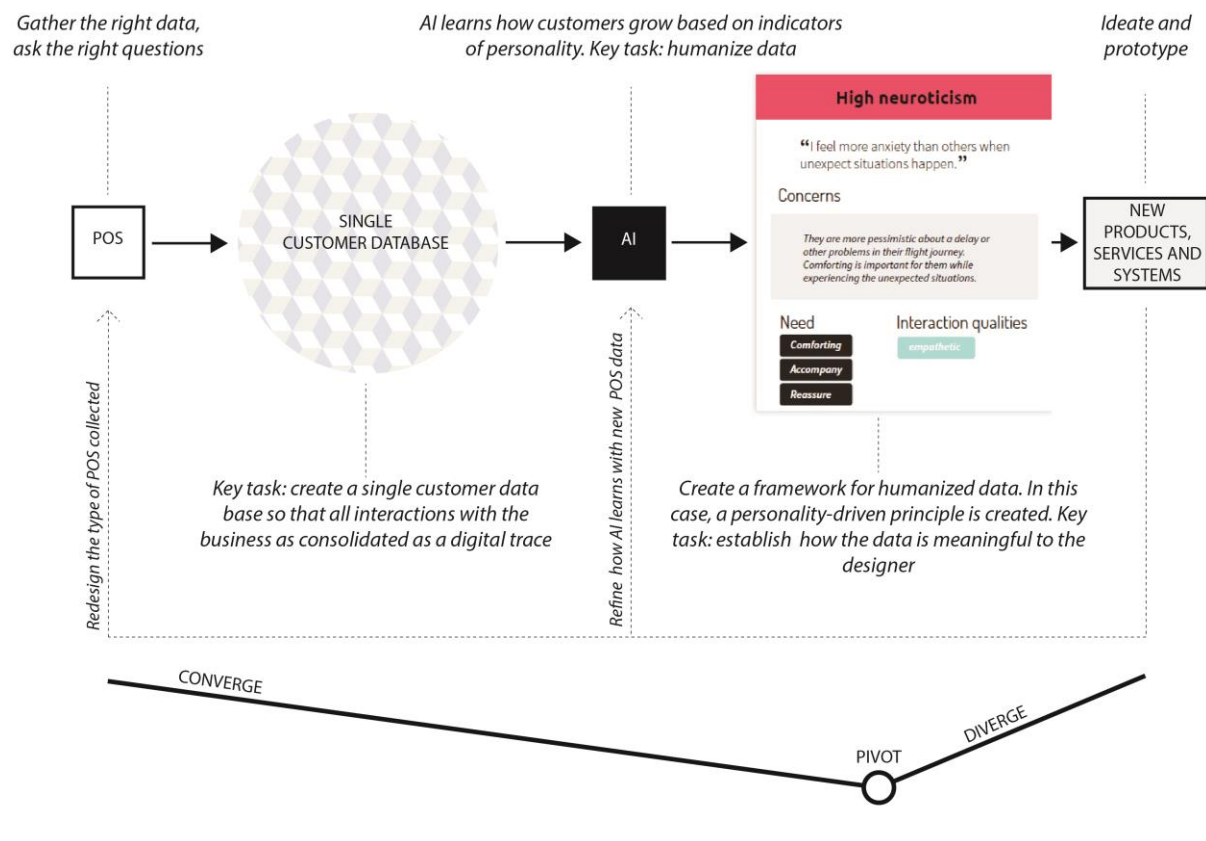


Figure 7. A framework for using Data and AI as design material. When the principle is automated into an operating system, then a set of services and processes can be adapted according to passenger personality type at any touchpoint. This framework assists organizations to develop dialogue with customers beyond the purchase point through data, representing a democratisation of the traditional B2C perspective. The new perspective becomes B2C2B – a closed loop of dialogue between customer and business that leads to improved value creation and capture for both parties

Learning on the Job with AI

Learning on the job is the notion that an organisation can learn and grow as its customer also grow in life. Collecting data by asking explicit questions to passengers during every POS business interaction is not a sustainable approach. The passenger may like to 'skip' such questions or even become frustrated with the service and choose another. In order to make data collection resonate with lean or agile businesses, the process must be less disruptive to B2C relationships. Learning on the job is the strength of AI will enable an organisation to grow with customers by tracking online behaviour – with privacy protocol in place.

This way of measuring personality is less disruptive to the passenger, and also more accurate in a sense that the results are based on behaviour, rather than how a customer describes themselves. However, such a concept requires further research to overcome privacy constraints. The ethics of data use are ever-current. Greater transparency regarding how data is collected and used is required to educate consumers. Designing services and products that explicitly show consumers how data is collected, held privately and used to benefit their experience has been the approach throughout

this project. A lead user group who actively contribute data might be one way of testing a prototype for this service.

Conclusion and Implications

The proposed personality-driven design principle derived from literature review and design practices is just one suggestion to humanise data using AI. The original big five personality research (Goldberg, 1990) and personality related research was extended to the aviation context. A relationship was found between customer's personality and their preferences in their flight journey, which suggests the value of taking personality into account for personalisation. For an airline, or any organisation pursuing a personalisation based strategy, this design principle when partnered with data and AI can enable services and products to be tailored to the individual. AirlineX competes on customer intimacy by providing exceptional customer experience through its frontline staff – notably its cabin crew. However, now the airline can also compete through deeper personalisation of products and services that adapt to passengers overtime. This carries great implications for considered the business model as a dynamic entity – capable of shifting form in response to personal preferences. The implications of this project for designers are identified:

- The 'big five' translates to a set of needs and interaction qualities that are aviation specific;
- The designer can plan what type of data is collected from customers by asking the right questions;
- AI provides the cognition to analyse data, but still requires a set of design-principles to add meaningfulness in the form of humanization;
- Humanised data is meaningful data for the designer.

Future Research

For all of the technology advancements since the creation of the internet, the infant stages of a true digital economy are only yet being realised. A fundamental shift in the way that society operates is approaching with consequences for the design research and practice. What must be avoided, is an organic explosion of possibilities such that was witnessed with the internet - given the ethical complexity of AI and data. Therefore, future research must focus on the role of the designer as a translator of technology into life. More particularly, research must address the responsibility of designers as developers of ethical frameworks for technology as additions to society.

References

- Apple Inc.. (2017). Unaudited Summary Data. Retrieved from <https://www.apple.com/newsroom/pdfs/Q1FY17DataSummary.pdf>
- Boeijen, A., Daalhuizen, J., & Schoor, R. (2014). *Delft Design Guide: Design Strategies and Methods*: BIS Publisher.
- Borghans, L., Duckworth, A. L., Heckman, J. J., & Weel, B. T. (2006). The Economics and Psychology of Personality Traits. *The Journal of Human Resources*, 43(4), 972-1059.
- Coelho, P. S., & Henseler, J. (2012). Creating customer loyalty through service customization. *European Journal of Marketing*, 46(3-4), 331-356.
- Desmet, P. M., Nicolás, J. C. O., & Schoormans, J. P. (2008). Product personality in physical interaction. *Design Studies*, 29(5), 458-477.
- Goldberg, L. R. (1990). An alternative "description of personality": The big-five factor structure. *Journal of Personality & Social Psychology*, 59, 1216-1229.
- Headey, B., Muffels, R., & Wagner, G. G. (2012). *Choices Which Change Life Satisfaction: Similar Results for Australia, Britain and Germany*. DIW Berlin Discussion Paper No. 302.
- Kosinski, M., Stillwell, D., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behaviour. *Proceedings of the National Academy of Sciences*, 110(15), 5802-5805.

- McKinsey Global Institute. (2017). *Artificial intelligence: The next digital frontier?* McKinsey Discussion Paper. CA: US
- McRae, R., & Torbert, R. (2004). Openness to Experience In C. Spielberger (Ed.), *Encyclopedia of Applied Psychology (1 ed.)*: Academic Press.
- Menon, S., & Sarker, S. (2016). Privacy and Data: Scalable Approaches to Sanitize Large Transactional Databases for Sharing. *MIS Quarterly*, 40(3), 931-981.
- Price, R., & Wrigley, C. (2016). Design and a Deep Customer Insight Approach to Innovation. *Journal of International Consumer Marketing*, 28(2), 92-105.
- Principle of Management(2013). *Personality and values*. Retrieved from <https://open.lib.umn.edu/principlesmanagement/chapter/2-3-personality-and-values-3/>
- Rae, J. (2016). Design Value Index Exemplars Outperform the S&P 500 Index (Again) and a New Crop of Design Leaders Emerge. *Design Management Review*, 27 (4), 4-11.
- Redman, T. (2013). Are You Data Driven? Take a Hard Look in the Mirror. *Harvard Business Review*, 2013.
- Rothmann, S., & Coetzer, E. P. (2003). The big five personality dimensions and job performance. *Journal of Industrial Psychology*, 29(1), 68-74.
- Smith, T. W., & Williams, P. G. (1992). Personality and Health: Advantages and Limitations of the Five-Factor Model. *Journal of Personality*, 60(2), 395-425.
- Stappers, P. J., & Giaccardi, E. (2017). Research through Design. In M. Soegaard & R. F. Dam (Eds.), *The Encyclopedia of Human-Computer Interaction (2 ed.)*: Interaction Design Foundation.
- Stritzke, W. G., Nguyen, A., & Durkin, K. (2004). Shyness and computer-mediated communication: A self-presentational theory perspective. *Media Psychology*, 6(1), 1-22.
- Swanberg, A. B., & Martinsen, Ø. L. (2010). Personality, approaches to learning and achievement. *Educational Psychology*, 30(1), 75-88.
- UC Berkeley. (2017). Strong AI. In OCF at. UC Berkeley (Ed.), *Computer Intelligence and the Turing Test*. CA: USA: UC Berkeley. Retrieved from <https://www.ocf.berkeley.edu/~arihuang/academic/research/main.html>
- Verganti, R. (2009). *Design-Driven Innovation: Changing the Rules of Competition by Radically Innovating what Things Mean*. Boston: Harvard Business Press.

About the Authors:

ir. Mengqi Yuan is promising young service and interaction designer. After completing her Masters of Science at TU Delft, Netherlands, she began at Alibaba Group in Shanghai, China. Yuan is an example of the new-age design talent heralding from China.

Dr. Rebecca Price is a Post-Doctoral Research Fellow at Delft University of Technology, Netherlands. Her research explores the implementation of strategic design with emphasis on digital subject matter. Price is also part of the EU commissioned Horizon 2020 research project, 'PASSME'.

Prof. ir Jeroen va Erp is Professor of Concept Design at Delft University of Technology, Netherlands. In 1992, van Erp founded Farbique in Delft, which positioned itself as a multidisciplinary design bureau. Van Erp has worked with clients such as the Tate Modern and National Gallery London.

Jorge Andres Osorio Socha is a Digital Development Manager at *AirlineX*. From Colombia with a background in computer sciences, industrial engineering and ICT, Socha is taking leadership within his organisation to drive development of customer-centred digitisation solutions.

Appendix A – 8 Personality Cards

High extraversion

“I enjoy the feeling of being the center of attention”

Concerns

Extraverted passengers enjoy the feeling of being the center of attention. They are looking forward to meet new people in their flight journey.

Need

Meet new people

Attention seeking

Interaction qualities

Lively

Passionate

Low extraversion

“I want to get things done without too much interpersonal communication”

Concerns

Introverted passengers may too timid to express their request on the flight. For instance, ask for an extra meal. Introvert passengers prefer more private ways of interacting, too much interpersonal communication makes them feel uncomfortable.

Need

Self space

Interaction qualities

Private

Calm

High conscientiousness

“I should do things RIGHT!”

Concerns

High conscientiousness passengers are strictly stick to their plan, they spend time on details and expecting appreciation for their organize, punctuality and accuracy.

High conscientiousness passengers want to do every step well. Doing the right things is important for them. They are not afraid of facing problems, as long as they can prepare for it.

Need

Acknowledged

Predictable

Interaction qualities

structured

transparent

Low conscientiousness

“It is not necessary to follow the standard process.”

Concerns

Low conscientiousness passengers have their own ways of catching the whole process. They have less struggles of doing tasks well. Consequently, they may not stick to a regular process strictly and have high risk of falling in troubles. At the same time they don't want to be taught what to do.

small mistakes are bearable, which makes them feel unnecessary to follow the exact standard process.

Need

Less but to the point information

not being forced to change

Interaction qualities

spontaneous

respectful

on demand

High agreeableness

“Some sacrifices make me feel a bit uncomfortable, but I should help people who are in need.”

Concerns

While traveling, agreeable passengers anticipate the needs of others. They may give other people helps and may even sacrifice for others at expense of self. For instance, agree to change seat with others on the flight, even they feel uncomfortable with this request. In this situations, being acknowledged is important for them.

While flying, agreeable passengers see themselves as a member of a group. They want to be nice to staffs and other passengers.

Need

Acknowledged

Enable to help others

Interaction qualities

Warm

Low agreeableness

“I don't want to be bothered by other people's problem/requests in my flight trip.”

Concerns

Low agreeableness passengers emphasis on the self-value in their flight journey. Stand up for their own interests is important for them. They don't want to be bothered by other people's problem. Their trip is the center of their focus.

Need

Less disturbed by other people

High openness to experience

“Creative stimulations bring me inspirations”

Concerns

They are open to try out new services and products, and also willing to make changes during their journey.

Need

New options

Surprises

Creativity

Interaction qualities

explorative

Inspired

low openness to experience

“Following previous steps makes me feel at ease.”

Concerns

They don't like abstract things. When communicating with them, they prefer to get answers like “yes” or “No”, rather than things in between.

Need

Routine

Interaction qualities

concrete

Traits	Needs		Interaction qualities	
High Extraversion	Meet new people	Attention seeking	Passionated	Animated
Low Extraversion	Self space		Private	Calm
High Conscientiousness	Acknowledged		transparent	
	Predictable		structured	
Low Conscientiousness	Less but to the point information		on demand	spontaneous
	Not being forced to change		respectful	
Low Agreeableness	Less disturbed by other people			
High Agreeableness	Acknowledged		warm	
	Enable to help others			
High Neuroticism	Comforting	Reassure	Accompany	reliable
Low Neuroticism	Acknowledged			
High Openness	New options	Creativity		explorative
	Surprise			Inspired
Low Openness	Routine			concrete

High neuroticism

“I feel more anxiety than others when unexpected situations happen.”

Concerns

They are more pessimistic about a delay or other problems in their flight journey. Comforting is important for them while experiencing the unexpected situations.

Need

Comforting

Accompany

Reassure

Interaction qualities

empathetic

Low neuroticism

“Everything gonna be alright”

Concerns

They are more calm when dealing with unexpected situations, both with problems and surprises.

Need

Acknowledged