Bachelor Thesis

IUBH University of Applied Sciences · Campus Studies

International Hospitality Management

Automation and the Creative Industry – The Impact of the Integration of Artificial Intelligence on Consumers' Perception and Evaluation of Creative Products

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i. Acknowledgements

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ii. Abstract

The purpose of this thesis is to investigate the impact of the integration of Artificial Intelligence into the creative process on consumers' product perception and evaluation. This research aim is applied to the context of musical composition, for which two musical product categories are considered, high (song) and low involvement (soundtrack).

The quantitative primary data is collected by an experimental approach. Participants are exposed to one of three experimental conditions. In a narrative provided to the participants, the composition process is thereby either outlined as human work, as the result of human-AI co-creation or as fully automated.

The dependent variables considered are participants' perception of quality, emotional and social value, product and process novelty as well as the level of expertise attributed to the artist(s). The experiment considers 98 participants, fairly evenly distributed over all three experimental conditions. The sample is based on convenience sampling, as a form of non-probability sampling. Considering all limitations to this study, including the non-representative sample structure and size, the findings may not be directly applicable to other creative contexts and cannot claim full generalisability.

With regard to the research aim, data analysis finds the narrative only of significant influence on perceived process novelty. Participants, on average, rate process novelty highest for both product categories if these products are presented as automated and second highest if assumed to be the outcome of co-creation. For all other dependent variables measured, no statistically significant difference across experimental conditions can be reported.

Keywords: *Creativity · Artificial Intelligence · Artificial Creativity · Co-Creation*

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v. List of Abbreviations

ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
CST	Creativity Support Tool
CT	Convergent Thinking
DT	Divergent Thinking
DV	Dependent Variable
IV	Independent Variable
N1	Experimental Condition 1 (Human Narrative)
N2	Experimental Condition 2 (Co-Creation Narrative)
N3	Experimental Condition 3 (Automated Narrative)
Q1	Product Group: High Involvement (Song)
Q2	Product Group: Low Involvement (Soundtrack)

1. Introduction

> "International annihilation will be the price we pay for a lack of creativity" (Rogers, 1954, p. 250)

Creativity has repeatedly been identified as an economic factor of large significance – to individual businesses and industry sectors as well as to the success of whole nations (Sawyer, 2013; Shalley, Hitt & Zhou, 2015). A recent report from the BOSS Group, surveying over 425 creative team leaders across a wide array of professional fields, found creative innovation to be the second biggest challenge facing companies (The BOSS Group & Cella Consulting, LLC., 2019). Its positive effect on company productivity and promising potential for customers' value creation (Wilf, 2014) have in fact led experts to label creativity as "the ultimate economic resource" (Florida, 2006, p. xiii).

Over the past decades, exponential technological advancements have increasingly found their way into the realm of creative professions. Artificial Intelligence, in particular, continues to provide interesting developments to the generation of creative products – a domain traditionally viewed as closely and even exclusively related to human nature (Meusburger, 2009; Rhodes, 1961). The prevailing Creative era (Hartley, Wen & Li, 2015) has met what researchers refer to as The Fourth Industrial Revolution (Schwab, 2016) – merging creative processes with the idea of increased automation.

Reports from within the music industry on the formation of a partnership between corporate heavyweight Microsoft and OpenAI, creators of the MuseNet platform for automated musical composition (OpenAI, 2019), or on the Warner Music Group signing AI-music startup Endel (Endel, 2019; Wang, 2019), are examples that show this technological integration is well underway. Yet to-date it remains unclear which impact the integration of Artificial Intelligence into creative processes may have on consumers' perception and valuation of creative products.

1.1 Personal Motivation

Elon Musk spoke of Artificial Intelligence as possibly "the biggest existential threat" (McFarland, 2014, para. 1) to humanity, followed by a portentous warning – "with artificial intelligence we are summoning the demon" (McFarland, 2014, para. 1).

While statements like these may be argued to be overly theatrical and possibly unfit for direct business application, I believe it can stand that Artificial Intelligence has already seen and, in its further development, will continue to see fundamental disruptions across

the vast majority of industries.

For my Bachelor's dissertation at the University of Brighton I investigated the impact of this technology, in the form of AI-Chatbots, in the context of hospitality provision (Maw, 2019). Driven by curiosity, I attempted to understand how the involvement of intelligent machines may affect our understanding of a concept so strongly linked to human abilities – an approach also very much transferable to creativity. The potential for automating what are believed by many to be exclusively human characteristics challenges not only businesses and consumers, it also challenges established academic frameworks – pushing the boundaries of known, human-centred conceptualisations.

1.2 Aims and Objectives of this Research

This Bachelor thesis aims to examine to which extent the integration of Artificial Intelligence of varying degrees into the creative process may influence consumers' product perception and evaluation.

The following research objectives shall thereby guide the work.

- To critically review interdisciplinary literature related to the research of creativity, Artificial Intelligence as well as Artificial Creativity and the concept of value. *(Research Objective 1)*
- To gather primary data regarding consumers' product perception and evaluation given three distinct degrees of involvement of Artificial Intelligence
  - for a high involvement creative product
  - and for a low involvement creative product. *(Research Objective 2)*
- To reach a conclusion on the impact the integration of Artificial Intelligence may have on consumers' product evaluation within creative sectors. *(Research Objective 3)*
- To provide managerial recommendations for the consumer-oriented handling of this technological integration in the creative industry. *(Research Objective 4)*

1.3 Structure of the Thesis

Following the introduction, outlining the main research aim as well as the rationale behind this topic choice, the literature review outlines and critically examines the three main theoretical concepts of interest – starting with creativity, leading on to Artificial Intelligence and so-called Artificial Creativity, and lastly the concept of consumer value. The insights gained here are combined to form a conceptual framework and, applied to the

contextual focus of music as a creative product, guide the subsequent primary data collection.

The third chapter includes all relevant methodological considerations, discussing the research design and detailing the experimental procedure. The results of primary data collection are then presented, and the main findings discussed. Finally, this leads on to the conclusive statement, research limitations to be considered for the reported findings as well as relevant recommendations for future research and industry application.

2. Literature Review

This chapter shall form the theoretical foundation of this thesis. It discusses three highly complex concepts – namely creativity, Artificial Intelligence and its application to creative processes as well as consumer value.

Understanding these fields separately but also the implications one might hold for another, is fundamental in assessing the impact Artificial Intelligence may have on consumers in the creative industry.

2.1 Creativity

Creativity as a research field gained momentum in the 1950s ((Deliège & Wiggins, 2006; Kaufman & Beghetto, 2009), after the lack of scientific publications on this topic had been publicly criticised (Guilford, 1950).

The resulting body of literature can be divided, depending on the main point of focus of the respective work. According to the Four P Model of Creativity by Rhodes (1961), research into creativity may be concerned with

- the creative **product** and its characteristics,

- the **person**, i.e. the creative individual,

- the **process** involved in creative work as well as related cognitive patterns,

- and lastly, the so-called **press** – referring to the context in which the creative expression occurs or other external forces influencing any of the above.

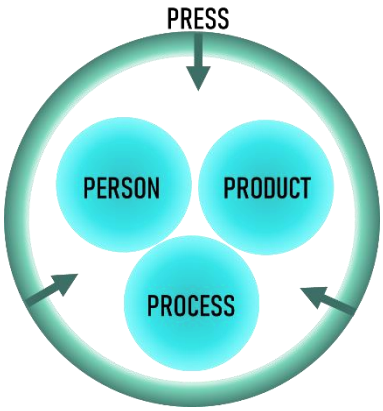


Figure 2.1 Four P Model of Creativity (own visualisation, based on Rhodes, 1961; Sawyer, 2013)

These research streams are by no means mutually exclusive.

On the contrary, researchers in this field are encouraged to consider not one aspect of

creativity in isolation but to recognize their interrelation (Rhodes, 1961; Sawyer, 2013). Apart from the differing approaches towards the concept of creativity, it also touches upon a large number of scientific domains – among many others anthropology, neuroscience or psychology. Most publications are limited to one specific scientific discipline, resulting in a "growing fragmentation of the field" (Hennessey & Amabile, 2010, p. 571). As a consequence, research falls short of an agreed-upon definition of creativity that encompasses valuable insights gained across all relevant sciences (Sawyer, 2013; Zimbardo, Johnson & Weber, 2008).

2.1.1 The Challenge of Defining Creativity

"Defining creativity may be one of the most difficult tasks facing the social sciences"
(Sawyer, 2013, p. 7)

When examining the multitude of attempts to define the concept (Figure 2.2), two important aspects of creativity become apparent. Most researchers seem to agree that creative products or processes are assessed as such based on their **novelty** and **value** (Beresnevičius & Beresnevičienė, 2013; Hennessey & Amabile, 2010). Furthermore, creativity is seen as a **socio-cultural phenomenon requiring recognition and validation** by some reference group.

Therefore, for the purpose of this study, the following definition shall be deemed suitable.

"**Creativity is the generation of a product that is judged to be novel and also to be appropriate, useful or valuable by a suitably knowledgeable social group**"
(Sawyer, 2013, p. 8)

Figure 2.2 Definitions of Creativity

"[Creativity is] the generation of a product that is judged to be novel and also to be appropriate, useful or valuable by a suitably knowledgeable social group" (Sawyer, 2013, p. 8)	"[Creativity is defined by its output of] socially valuable products" (Barron & Harrington, 1981, p. 441)	"[Creativity is] regarded as the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced" (Amabile, 1983, p. 31)	"Creativity typically means originality or the ability to produce valued outcomes in a novel way" (Shiraev & Levy, 2007, p. 155)

"[Creativity is] a process that results in a novel work that is accepted as useful, tenable, or satisfying by a significant group of people at some point in time" (Stein, 1974, p. xi)	"A product or response will be judged as creative to the extent that (a) it is both a novel and appropriate, useful, correct or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic" (Amabile, 1983, p. 33)	"Creativity is the ability to come up with ideas or artefacts that are new, surprising and valuable" (Boden, 2004, p. 65)	"As long as a product, scientific concept, or piece of art has not been validated by peers, experts, or users, it is not regarded as creative." (Meusburger, 2009, p. 106)
KEY: evidence for socio-cultural phenomenon		characteristics related to creative products/processes	

Figure 2.2 Definitions of Creativity (developed by the author based on Amabile, 1983; Barron & Harrington, 1981; Boden, 2004; Meusburger, 2009; Sawyer, 2013; Shiraev & Levy, 2007; Stein, 1974)

This definition applies best to what is considered "professional creativity" (Kaufman & Beghetto, 2009, p. 2), or **Pro C** – the second to last category of creative expression. Researchers have distinguished these categories as follows – the first kind of creativity is termed Mini C (Kaufman & Beghetto, 2009). It refers to the "creative process involved in the construction of personal knowledge and understanding" (Hennessey & Amabile, 2010, p. 572). In other words, Mini C is closely linked to information processing and learning (Beghetto & Kaufman, 2007), and as it concerns only the individual, it does not require any external communication or social recognition. The second stage of creativity is that of Little C (Cropley & Cropley, 2011; Hennessey & Amabile, 2010). It describes an amateur level of creativity and implies an element of expression to others (Beghetto & Kaufman, 2007; Kaufman & Beghetto, 2009). These two stages mirror what Boden (1994) identified as psychological creativity (P-creativity; Boden, 2004) – they encompass creative products and processes that are new to that individual or group of individuals, regardless of whether these outputs have previously been produced by others.

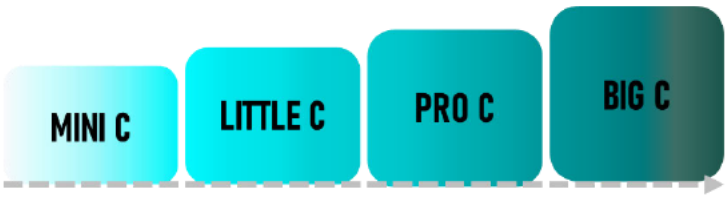


Figure 2.3 Stages of Creativity – Mini C to Big C (own visualisation, based on Cropley & Cropley, 2011; Kaufman & Beghetto, 2009)

An individual with considerable expertise in a specific field may exhibit "highly accomplished (but not yet eminent) forms of creative expression" (Kaufmann & Beghetto, 2009, p. 2) – Pro C. While many individuals may eventually pass through these three

stages, few reach what is termed Big C or "eminent creativity" (Hennessey & Amabile, 2010, p. 572). Such historical creativity (H-creativity; Boden, 1994; Boden, 2004), refers to the rare event of ideas being developed for the very first time. Being so high in originality and value, they have a large impact on society as a whole and the individuals associated are often considered creative geniuses (Cropley & Cropley, 2011; Kaufman & Beghetto, 2009). For the latter two stages of creativity, the aspect of external valuation is mandatory.

2.1.2 A Typology of Creativity

Focussing, again, on mostly Pro C and partly also on Big C levels of creativity, these may be further broken down depending on their contribution to and impact on the respective field. The creative outputs may be categorised according to the Propulsion Theory of Creative Contributions (Kaufman & Beghetto, 2009; Sternberg, 1999; Figure 2.4).
Replication of existing work with minor alterations as well as shifting the purpose of existing creative products, termed **Redefinition** (Sternberg, Kaufmann & Pretz, 2001) – while considered as types of creativity – are of the lowest degree of novelty. They can be equated with the concept of combinational creativity, characterised by the "unfamiliar combinations of familiar ideas" (Boden, 2004, p. 3).
An increase in novelty is achieved by **Forward Incrementation** and **Advance Forward Incrementation**. Such contributions to a creative field are capable of adding new ideas to that conceptual space (Boden, 2004) – a dynamic described also as exploratory creativity (Boden, 2004). Whereas Forward Incrementation may "move the field forward in the direction in which it is already moving, and [take] the field to a point to which others are ready to go" (Sternberg, Kaufmann & Pretz, 2001, p. 79), Advance Forward Incrementation implies a much larger 'creative leap' in said given direction. It therefore involves a higher risk of lack of recognition by the respective reference group and often in hindsight is acknowledged as "ahead of its time" (Sternberg, Kaufmann & Pretz, 2001, p. 87). **Redirective** and **reconstructive** creativity attempts not to add to a creative field or its further progression in a set direction but rather to divert its future development. The latter, Reconstruction, thereby actually involves regressing to a previous state of said field, from which then a new creative path may unfold (Kaufman & Beghetto, 2009).
Argued as "the most radical of all" (Kaufman & Beghetto, 2009, p. 6), **Reinitiation** is not limited to redirecting the respective creative field but is additionally concerned with its transformation. Ideas classed as of this type of creativity challenge their respective

conceptual space – and result in the most novel creative expressions.

Lastly, **integrative** creativity or synthesis enables the individual(s) to blend previously distinct ideas within the realm of their field (Sternberg, 1999; Sternberg, n.d.; Sternberg, Kaufmann & Pretz, 2001)

Figure 2.4 Fusing Typologies of Creativity

Figure 2.4 Fusing Typologies of Creativity (own visualisation – based on Boden, 2004; Sternberg, 1999; Sternberg, n.d.; Sternberg, Kaufmann & Pretz, 2001)

2.1.2.1 Creativity – "A Matter of Degree" (Meusburger, 2009, p. 99)

As seen by the example of Advance Forward Incrementation, an increase in novelty of a creative product or process may decrease its acceptance by the external reference group (Boden, 2004; Sternberg & Lubart, 1992) – with novelty defined as "the 'distance' between that which is developed and that which existed" (Stein, 1974, p. 6). While the more radical forms of creativity (Gilson & Madjar, 2011; Madjar, Greenberg & Chen, 2011) are often those to bring about "significant breakthroughs" (Shalley, Hitt & Zhou, 2015, p. 2), they accordingly bare a larger risk of rejection. Following the notion of creative adaptiveness, creators' ideas are ascribed higher likelihood of success when "adhering to what is approved of or permitted in a given cultural context" (Cohen, 2011, p. 10), highlighting again the socio-cultural element to creativity.

2.1.3 The Emergence of Creativity

The aforementioned categorisations of creativity focussed on a) differentiating between individual versus social novelty (see section 2.1.1) and b) outlining the impact varying degrees of novelty may have on the field in question (see section 2.1.2). At this stage, a third and last complimentary perspective on creative expressions shall be introduced. Creativity, as a form of problem solving (Zimbardo, Johnson & Weber, 2008), may thereby also be analysed according to its underlying driver (**internal versus external**) and

the scope of the problem it is set out to solve **(open versus closed**) (Meusburger, 2009; Unsworth, 2001; Unsworth & Luksyte, 2015). An individual may be involved in the creative process for intrinsic purposes (internal driver) or by being commissioned or employed, for example, to provide a creative solution in a work-related context (external driver). For a visualisation of the corresponding matrix, see Appendix A.

How an individual, be it internally or externally driven, eventually arrives at a creative idea and therefore is able to provide such a creative solution, is still heavily debated among experts, and subsequently subject to on-going research. Indeed, even the recognition that creativity appears to involve a mental process (Pfeiffer Consulting, 2018; Stein, 1974; Zimbardo, Johnson & Weber, 2008) is not undisputed – with scientific efforts still combating the romantic conception of creativity as a "sudden, effortless and complete" insight (Abrams, 1971, p. 192). Such a lack of consensus, owed to the complexity of the topic, is a pattern that permeates the majority of literature on the emergence of creativity. The following subsections of this literature review will aim to include the most popular theories and, if feasible, also their opposing standpoints.

2.1.3.1 Creativity and Intelligence

To-date neuroscientific studies have been unable to definitively identify the brain regions responsible for the generation of creative ideas. What most scientists seem to agree upon, however, is the fact that not one but a combination of several brain areas is activated during this process (Benedek et al., 2014; Hennessey & Amabile, 2010; Mumford & Antes, 2007; Vartanian, 2011). This finding is tied to the variety of cognitive abilities and related processes involved in creative expression (Boden, 2004; Silvia, 2015).

In order to understand the cognitive processes behind creativity, researchers have suggested a complementary engagement of the two thinking styles **Divergent Thinking (DT)** and **Convergent Thinking (CT)**, previously often considered as distinct and unrelated (Barron & Harrington, 1981; Sawyer, 2013). Divergent Thinking results in the "production of ideas from given information, with an emphasis on variety and quantity of output" (Cohen, 2011, p. 10). Coinciding with De Bono's concept of lateral thinking (1977), it can be characterised as "generative" (De Bono, 1977, p. 37). This means an individual is then considered to demonstrate strong DT abilities, if they are able to develop a large number of possible solutions for a given problem (Sawyer, 2013; Tavris & Wade, 2001). An analysis or evaluation of the generated ideas is not required (Basadur &

Basadur, 2011). Traditionally this thinking style is exclusively equated with the idea of creativity and creative abilities, though researchers have increasingly criticised this view – "although divergent thinking is often considered to contribute to creativity, the constructs are not synonymous" (Plucker, Beghetto & Dow, 2004, p. 85).

Instead, creativity should be understood to also incorporate Convergent Thinking, or the ability to "[select] best options from a broad range of possibilities" (Basadur & Basadur, 2011, p. 85). This vertical thinking style (De Bono. 1977) focusses on selecting one solution based on its evaluated quality or suitability (De Bono, 1977; Sawyer, 2013; Tavris & Wade, 2001). It is usually linked to intelligence and thought of as uncreative (Sawyer, 2013; Tavris & Wade, 2001). And while the exact relation between intelligence and creativity remains unclear (Barron & Harrington, 1981; Hennessey & Amabile, 2010), they are considered linked (Silvia, 2015). Zimbardo et al. (2008) reported low levels of intelligence to hinder the generation of creative ideas but found no converse effect of this phenomenon. Intelligence can be identified as a threshold resource (Lubart & Guignard, 2004; Sternberg & Lubart, 1992) for creativity, matching the conclusion that "intelligence and knowledge are necessary, but not sufficient, conditions for creativity" (Meusburger, 2009, p. 102).

2.1.3.2 The Creative Process

Sawyer (2013) devised eight stages to the creative process, each relying on a variety of cognitive abilities, which can be mapped to subdivisions produced by other authors (Appendix B). The preparatory tasks of problem identification and knowledge construction are followed by a stage termed Incubation (Boden, 2004; Sawyer, 2013). This phase refers to information processing and involves no "conscious effort" (Stein, 1974, p. 13). During such a stage the individual experiences what is commonly referred to as inspiration, or as described by Kris (1953), "things appear in [the individual's mind] of which he never seemed to have known" (p. 343). The subsequent development of ideas is also referred to as "illumination" (Stein, 1974, p. 14) – following a traditional view of divergent, or generative, thinking as synonym for creativity, the creative process would end here. Sawyer (2013) incorporates CT activities as concluding the process before the creative product is finally externalised. It shall be noted that these eight stages must not necessarily occur in this linear fashion or order and often transition fluently into one another (Sawyer, 2013). The process as outlined by Sawyer also may not apply to all levels of creativity (Unsworth & Luksyte, 2015; see section 2.1.1)

Lastly, an important aspect of conceptualisations of creativity, such as those mentioned above, to be emphasized here is that they define **creativity as reliant on previous knowledge and experiences** (Sawyer, 2013; Stein, 1974). Creative ideas are accordingly defined as "the reworking (or selection and recombination) of a given set of building blocks" (Wilf, 2014, p. 398), and "extensive and organized knowledge" (Zimbardo, Johnson & Weber, 2008, p. 319) is considered a necessary requirement for creative individuals (Boden, 2004; Sternberg & Lubart, 1992). The stance that creativity depends on a recombination of known mental concepts is based on the not uncontroversial (Dartnall, 1994) philosophical theory of associationism, lead – among others – by Bain (1855), who stated, "the new combinations grow out of elements already in the possession of the mind" (p. 572). As Sawyer (2013) asserted, "all creativity includes elements of imitation and tradition" (p. 28) – and, linking to the previous section, it infers that the degree of novelty exhibited is determined by the extent to which a creative idea deviates from this reference point.

2.2 Artificial Intelligence and Creativity

- "perhaps, it is art amongst all endeavours that defines who we are"
(Brown, 2018, p. ix)

Creativity, as an element of artistic expression, is by many considered profoundly and exclusively human (Meusburger, 2009; Pfeiffer Consulting, 2018; Rhodes, 1961). Closely tied to culture and the generation of cultural products (Sawyer, 2013), some researchers claim creativity to be at the very core of what distinguishes humans from all other species (Dissanayake, 1988; Florida, 2006). Creative expression is strongly linked to the notion of self-actualisation (Maslow, 1943; Stein, 1974), a sense of fulfilment (Lindauer, 2011) and pleasure (Dissanayake, 1988), and with that identified as an autotelic activity (Compton & Mateas, 2015) – meaning, creativity - or rather intrinsically-driven creativity (see section 2.1.3) is not a means to an end but an end in itself. It resonates with a "universal human proclivity or need" (Dissanayake, 1988, p. 7), the "need to create" (Beresnevičius & Beresnevičienė, 2013, p. 38).

"Art is said to provide a sense of meaning or significance or intensity to human life that cannot be gained in any other way" (Dissanayake, 1988, p. 70). And while technology is widely accepted as effective in supporting individuals in their creative aspirations (Pachet, 2006; Pfeiffer Consulting, 2018; Shirky, 2010), one particular technology shall be examined here for its potential to challenge this human-centred perspective by shifting

technological involvement from creativity stimulation to simulation – Artificial Intelligence.

2.2.1 Artificial Intelligence – Its Definition and Impact

Artificial Intelligence (AI) has a vast scope of application and the complexity of this multifaceted technology affords various approaches to its definition. As this thesis focusses on the possible automation of the processes underlying creative products, AI shall be defined according to its ability to think and act humanly (Russell & Norvig, 2010). The selection of such a research focus yields following definition, of Artificial Intelligence as

> **"a constellation of technologies […] that allows for machines to sense, comprehend, act and learn"**
>
> (Accenture, 2019, What it is)

Artificial Intelligence is driven by machine learning - i.e., the autonomous alteration of a system's underlying algorithms aimed at optimising data processing and output generation, or deep learning, a subcategory of machine learning involving multi-layered artificial neural networks (Radziwill & Benton, 2017; Riikkinen, Saarijärvi, Sarlin & Lähteenmäki, 2018; statista, 2019). Therefore, it generally refers to "the capability of a device to perform functions that are normally associated with human intelligence, such as reasoning, learning and self-improvement" (Willick, 1983, p. 6; see also Copeland, 2019; Weber Shandwick, 2016) or as suggested by Rich, Knight and Nair (2009), entails "the study of how to make computers do things at which, at the moment, people are better" (p. 3).

While some critics voice a pessimistic view on the further development and application of AI, with the technology deemed to cause either direct (Destructive AI) or indirect (Risky AI) harm to the field it is applied to and to society at large (Fast & Horvitz, 2017; Russell, Dewey & Tegmark, 2015), a generally positive tenor towards this technology can be detected (Weber Shandwick, 2016). Artificial Intelligence is seen to be at the heart of what the World Economic Forum termed 'The Fourth Industrial Revolution' (Schwab, 2016) and accordingly is unanimously identified as a highly disruptive element (PricewaterhouseCoopers International, 2017; Riikkinen et al., 2018; Russell, Dewey & Tegmark, 2015). In this context, experts predict a rise in productivity, ergo in economic performance on the grounds of further integration of automated systems (McKinsey Global Institute, 2018). By 2030 it is estimated that Artificial Intelligence and related processes could account for an increase of USD 15.7 trillion to the global Gross Domestic Product – translating to roughly 14% (PricewaterhouseCoopers International, 2017).

2.2.1.1 Artificial Intelligence and the Creative Industry

As for "the symbiosis between the creative and the digital worlds" (United Nations Conference on Trade and Development, 2019, p. 15), the anticipated effects of automation on the creative industry are of particular interest due to the aforementioned prevailing perception of creativity as an exclusively human ability (see section 2.2).

The creative industry is formed out of a country-dependent (Newbigin, 2014) variety of subsectors. At its core it can be understood to include literature, music, the performing, and visual arts (UNESCO, 2013). For the purpose of this thesis it shall be clearly distinguished from what is termed the creative economy, a concept that sees the inclusion of "all creative activities, both within creative industries and creative occupations" (Otis College of Art and Design, 2019, Terminology; see also Department for Culture, Media & Sport, 2015; GOV.UK - Department for Digital, Culture, Media & Sport, 2001; United Nations Conference on Trade and Development, 2019) This exclusion of occupation-focussed conceptualisations of creativity is based on the difficulty in accurately assessing and reporting such an extensive cluster (Newbigin, 2014).

Economists attribute a large global importance to the creative industry (UNESCO, 2017). With a market value of USD 509 billion in 2015 (United Nations Conference on Trade and Development, 2019) – for reference, the reported global revenue for the wider creative economy in 2017 was estimated as USD 2,250 billion (UNESCO, 2017) - it is referred to as a "significant sector and a meaningful contributor to national gross domestic product" (United Nations Conference on Trade and Development, 2019, p. 3).

The development of Artificial Intelligence is predicted to have a significant impact (Hall & Takahashi, 2017) on this growing industry (Sawyer, 2013; Statistisches Bundesamt, 2019). A study conducted by Pfeiffer Consulting (2018), however, reported little concern among creative professionals over a possible substitution through AI. These findings are supported by other sources classifying the majority of creative professions as of no or very low risk of automation (Nesta, 2015). In fact, given the current state of technology, it is theorised that only five percent of occupations across all economic industries could be subject to complete automation (McKinsey Global Institute, 2017). Nevertheless, Artificial Intelligence is anticipated to further the existing trend of focusing rather on the delivery of creative goods and services than on their production (Newbigin, 2014; United Nations Conference on Trade and Development, 2019). So while the available reports suggest that Artificial Intelligence will not have a negative effect on the creative industry per se, the automation of creative processes is linked to a concern over devaluation of the creative

product, fuelled by AI's potential "levelling effect on creative output, [resulting in] a new level of homogenized, machine-driven mediocrity" (Pfeiffer Consulting, 2018, p. 16).

2.2.2 Artificial Creativity

To better understand the fear of devaluation of creative products through the involvement of automation, it is necessary to closer examine the integration of AI into the creative process.

Related to terms such as Computational Creativity (Compton & Mateas, 2015) or Machine Creativity (Boden, 2004), Artificial Creativity refers to a system's capability of "**achieving or simulating behaviour which in humans would be deemed creative**" (Wiggins & Forth, 2018, p. 3). Here the equivalent to novelty as exhibited by human creators is the degree of data transformation, i.e. the creative distance for AI-involved products is determined by the "perceived difference between a program's initial data and its output" (Bringsjord & Ferrucci, 2000, p. 161).

2.2.2.1 The Four Stages of Artificial Intelligence in Creativity

Merging numerous perspectives on the topic as extracted from the relevant literature, the possible involvement of technology, in particular of Artificial Intelligence, in the creative process can be divided into four stages. Examples of respective industry applications have also been identified (Appendix C).

Figure 2.5 Degrees of Involvement of Artificial Intelligence in Creative Processes

Figure 2.5 Degree of Involvement of Artificial Intelligence in Creative Processes (own visualisation - based on Davis et al., 2014; Jordanous, 2017; Lubart, 2005; Negrete-Yankelevich & Morales-Zaragoza, 2014; PricewaterhouseCoopers International, 2017)

Stage 1: **Artificial Intelligence as a Support Tool**

"Creativity Support Tools" (CST; Davis et al., 2014, p. 38) provide the technological "environment" or "toolkit" (Negrete-Yankelevich & Morales-Zaragoza, 2014, p. 281) for an entirely human-driven creative process, acting merely as facilitators of such. As Creativity Support Tools do not even require an element of AI, this may occur through basic computer functions such as storage provision, an electronical communication system

or the option of file sharing among individuals involved in the creative activity (Lubart, 2005). Therefore, CSTs are not considered to have any direct involvement in the generation of creative products (Davis et al., 2014) – "just as telescopes, microscopes, and cameras are powerful devices that enable discoveries and innovations, they are still only tools; the act of creation is carried out by the users" (Shneiderman, 2007, p. 25).

Stage 2: **Artificial Intelligence as a Source of Inspiration and Assistance**

At this stage Artificial Intelligence may be used for two purposes within the still human-dominated creative process – the creator(s) may turn to it for inspiration or for assistance; either imply a direct, yet passive involvement of AI (Gobet & Sala, 2019; Kantosalo, Toivanen, Xiao & Toivonen, 2014).

This higher degree of AI involvement may strengthen the process facilitation outlined in Stage 1. As an assistant, Artificial Intelligence is considered effective in reducing the workload by automating routine tasks (Pfeiffer Consulting, 2018) and hence increasing efficiency (PricewaterhouseCoopers International, 2017).

The ability of artificially intelligent systems to access, process and analyse so-called big data (Armstrong, Kotler, Trifts & Buchwitz, 2017), qualifies it, on the other hand, as a source of creative inspiration. At this stage systems are programmed "to generate specimens or prototypes of partial or complete pieces of work that meet correctness rules" (Negrete-Yankelevich & Morales-Zaragoza, 2014, p. 282), subsequently used as the basis for further processing by human creators. Humans benefit from such "computer-initiated creativity" (Jordanous, 2017, p. 159), as it facilitates access to creative ideas an individual may not have generated themselves (Lubart, 2005; Shneiderman, 2007).

Stage 3: **Artificial Intelligence as a Creative Partner – The Concept of Co-Creation**

The third stage of AI involvement is one "in which the computer [or system] at least *appears* to be creative to some degree" (Boden, 2004, p. 1). It sees Artificial Intelligence exert an active influence on the generation of creative products (Gobet & Sala, 2019; Kantosalo, Toivanen, Xiao & Toivonen, 2014; Lubart, 2005), and by reducing the role of the human creator(s), this results in a shift from a human-dominated to a human-involved process (Negrete-Yankelevich & Morales-Zaragoza, 2014). Artificial Intelligence of this degree of involvement is considered no longer a tool in creativity but a partner or colleague (Davis et al., 2014; Lubart, 2005).

The result of this is the phenomenon of co-creation, or human-computer collaboration. Co-creation generally describes "multiple parties contributing to the creative process in a

blended manner" (Davis et al., 2014). The active contributions of the parties involved (Jordanous, 2017) are thereby directed at "the realisation of a shared goal" (Edmonds, Candy & Poltronieri, 2018, p. 292). Creative collaboration can be either of complementary nature – during which a clear task division is undertaken based on the respective strengths and skills of the parties involved (John-Steiner, 2000), or an integrative one (John-Steiner, 2000) – in contrast, not allowing for a clear distinction of contribution to the final product. John-Steiner (2011) describes this as "at time such a complete fusion of styles that it is hard to distinguish the work of one from the other" (p. 223). Should the parties' respective creative activities not be of equal contribution to the final product, one may speak of Mixed-Initiative Co-Creation (Yannakakis, Liapis & Alexopoulos, 2014).
Human-computer collaboration, as one form of co-creative arrangement, refers to "creativity where both the human and the computer take creative responsibility for the generation of a creative artefact" (Kantosalo, Toivanen, Xiao & Toivonen, 2014, p. 1). Most experts appear to agree that such a hybrid system (Wiggins & Forth, 2018) of human and AI creators increases the creative performance potential beyond that achievable by either party in isolation (Boden, 2004; Davis et al., 2014; Kantosalo, Toivanen, Xiao & Toivonen, 2014; PricewaterhouseCoopers International, 2017; Schrage, 1990; Shneiderman, 2007).

Stage 4: **Artificial Intelligence as Autonomous Creator**

As stated, some believe that "the way AI really works well is when it works with people" (Schoettle, 2019, p. 16; see also Dean & McLean, 2018; Wen et al., 2015). In such co-creative processes, however, this requires some form of output selection or modification by a human (Boden, 2004; Elgammal, Liu, Elhoseiny & Mazzone, 2017), though the contributions made by Artificial Intelligence in such a collaborative context are already considered creative (Negrete-Yankelevich & Morales-Zaragoza, 2014).
The full automation of creative processes is able to eliminate the need for human involvement (Gobet & Sala, 2019; Kantosalo, Toivanen & Toivonen, 2015; PricewaterhouseCoopers International, 2017) or reduce it to purely managerial and administrative tasks regarding the "computer-generated" (Jordanous, 2017, p. 159) output (Negrete-Yankelevich & Morales-Zaragoza, 2014). This stage can be achieved through deep learning or the design of an "evolutionary program" (Boden, 2004, p. 9). It allows the system to self-evaluate generated outputs, identify opportunities for product and process improvement and alter the respective algorithms accordingly (Elgammal, Liu, Elhoseiny &

Mazzone, 2017). Therefore, this final stage of AI involvement in the creative process enables systems to "automatically generate novel, surprising, and valuable creative products" (Davis et al., 2014, p. 38).

2.2.2.2 The Controversy Surrounding Artificial Creativity

The active integration of Artificial Intelligence, as described above, is favoured by those ascribing this technology a high creative potential (Gobet & Sala, 2019; Kantosalo, Toivanen, Xiao & Toivonen, 2014). However, it should not go unnoticed that some researchers raise significant criticism and opposition towards this idea and the overriding concept of Artificial Creativity. Due to feasibility issues, the lengthy, and often highly philosophical question of whether a computerised system could ever exhibit true creativity shall be limited to the discussion of four major arguments within the debate.

1) **"AI does analytical. People will always do the creative and artistic element"** (Schoettle, 2019, p. 16)

This quote by Sean Brady, the president of Emarsys Americas – a large marketing platform, is an example of the persistent romanticized view of creativity. It disregards the neuroscientifically proven involvement of analytical thought processes in creative expression of humans (see section 2.1.3.1) and instead falls back onto a somewhat mystical character of creativity.

2) **The output generated by Artificial Intelligence is based entirely on the data fed into the system, it therefore cannot be deemed creative.**

Indeed for many practical applications of AI in the creative field it does hold true that in order for these systems to generate creative products or drafts of products, they are provided with existing, often human-generated examples of creative expression (see Appendix C). As explained in section 2.2.2, the novelty of resulting AI outputs is determined by the degree to which said output diverts from the data input.

The mere requirement for data input, especially in light of the theory of associationism, or theory of recombination (section 2.1.3.2) cannot suffice to disqualify AI-generated outputs as uncreative. Just as computerised systems depend on some form of data input, so do human creative processes build on knowledge, experience or preceding ideas (Elgammal, Liu, Elhoseiny & Mazzone, 2017). Pivotal for the characterisation as creative or uncreative, in both cases, is not the reliance on existing materials but the achieved degree of novelty.

3) **AI systems can only generate ideas that they were programmed to generate. The resulting predictability of output contradicts the element of surprise found in creative products.**

One of the best-known advocates for this perspective can be found in British mathematician Ada Lovelace, claiming that due to the programming restraints of a computerised system "it can do whatever we *know how to order it* to perform" (Lovelace, 1953, p. 398). Such a critical stance is often followed by the call for the credit of any idea generated through AI involvement to be awarded not to the system but its human programmer (Bringsjord & Ferrucci, 2000).

In turn, the flaw in such a line of argument may be two-fold. Firstly, if Artificial Intelligence is presented to be limited by certain programming specifications, the human mind may just as well be considered subject to similar limitations – with human creators being guided and at times restrained by underlying rules such as grammar or musical theory, depending on the form of creative expression. Boden (2004) actually stresses the neccessity of such limitations, stating that "to drop all current constraints and refrain from providing new ones is to invite not creativity, but confusion" (p. 95).

Furthermore, Lovelace and other critics imply that AI's creative potential is directly tied to the knowledge and abilities of its human programmers and thereby confined in a certain way by its initial coding (Lovelace, 1953; Mérő, 1990). The technological advancements in deep learning directly refute this. Through self-observation, self-evaluation and autonomous so-called reinforcement learning, applications of Artificial Intelligence have not only far exceeded humans' expectations towards the technology, they have been able to do so forgoing any human guidance in the process (Gobet & Sala, 2019; Silver et al., 2016; Silver et al., 2017).

4) **Artificially intelligent systems do not intend to be creative; they are programmed to do so.**

It must be acknowledged that scientists have expressed experiencing difficulties in computerising the aspect of intentional agency, i.e. the intrinsic meaning and motivation underlying a creative process (Guckelsberger, Salge & Colton, 2017). Where some critics do recognise Artificial Intelligence's creative abilities, they simultaneously point to the system's clear lack of intention or consciousness (Lovelace, 1953; Stein, 1974) – "no mechanism could feel […] pleasure at its success, grief when its valves fuse, be warmed by flattery, be made miserable by its mistakes" (Turing, 1950, p. 446). However, while in

many cases it may be agreed that "purpose, intention, and the desire to be creative set the groundwork for the creative idea" (Stein, 1974, p. 20), intention itself it not considered a defining characteristic of creativity (see section 2.1.1). Consequently, this shortcoming of Artificial Intelligence, as an argument, cannot be considered substantial enough to dispute the concept of Artificial Creativity.

> "The great dilemma of our time is that having generated such incredible creative potential, we lack the broader social and economic system to fully harness it and put it to use"
>
> (Florida, 2006, p. xiii)

The origin for many of the arguments made against Artificial Intelligence in creativity may be found, in part, in a phenomenon termed the **Uncanny Valley (UV) Effect**. Defined as a "feeling of eeriness and discomfort towards a given medium or technology" (Ciechanowski, Przegalinska, Magnuski & Gloor, 2019, p. 539), it occurs when individuals are confronted with a human-like technology or related product (Palomäki et al., 2018) in which they can detect inconsistencies in the form of non-human-like features (Broadbent, 2017). "It is becoming increasingly difficult to distinguish some computer information-processing from that of humans, judging from the final product" (Willick, 1983, p. 5), yet researchers have observed that certain outputs – which would be considered creative if produced by a human – are not judged as such simply because they were generated by a computerised system (Boden, 2004).

2.3 Value

> "Many arguments about creativity are rooted in disagreements about value"
>
> (Boden, 2004, p. 10)

As outlined earlier, for any product or process to be regarded as creative, it is not sufficient for it to be novel – it must also be deemed valuable by a certain social group.
Before investigating which possible impact the involvement of technology such as Artificial Intelligence may have on individuals' value perception of creative outputs, it is necessary to first examine the concept of value itself.

2.3.1 The Definition, Dimensions and Types of Value

Value – or the **cognitive-affective process of evaluation** (Grönroos & Voima, 2012; Kuniavsky, 2009; (Riikkinen, Saarijärvi, Sarlin & Lähteenmäki, 2018; Sánchez-Fernández & Iniesta-Bonillo, 2007) is a highly complex concept, with regard to both its definition as well as its measurement (Khalifa, 2004; Parasuraman, 1997; Zeithaml, 1988). Accordingly, academics treating value as unidimensional (Johnson, Herrmann & Huber, 2006; Zeithaml,

1988) are heavily criticised; such a simplification of the value concept (Sánchez-Fernández & Iniesta-Bonillo, 2007) is deemed insufficient to represent its inherent complexity. Hence, value shall be defined here as a **multidimensional construct** (Babin, Darden & Griffin, 1994; Sweeney & Soutar, 2001).

Holbrook (1999) defines three such dimensions (see Appendix D) to aid in the analysis of value – thereby value may be identified firstly either as extrinsic, as a means to an end (Holbrook, 1999; termed 'utilitarian value' by Babin, Darden & Griffin, 1994), or as intrinsic – "when some consumption experience is appreciated as an end in itself" (Holbrook, 1999, p. 10; termed 'hedonic value' by Babin, Darden & Griffin, 1994; also Hassenzahl, 2004). As a next dimension, Holbrook differentiates between self-oriented and other-oriented value, depending on whether it is defined by personal motivations or with reference to other members of society. Lastly, value formation may require active or only passive involvement of the individual in the consumption experience (Holbrook, 1999). And while Holbrook's work is found by some to be the "most comprehensive approach to the value construct, since it defines more sources of value than other studies" (Sánchez-Fernández & Iniesta-Bonillo, 2007, p. 441), those other typologies shall not be overlooked. From a comparative analysis of respective publications three types of value emerge as common among various product or output-related categories – **quality** or performance as a form of functional value, **social value** and **emotional value** (Holbrook & Hirschman, 1982; Shanker, 2012; Sheth, Newman & Gross, 1991; Smith & Colgate, 2007; Sweeney & Soutar, 2001).

2.3.2 The Emergence of Consumer Value

Regarding business application, said process of evaluation refers to the **perceived value** of an object – meaning the value as determined by the consumer. Perceived value can differ strongly from the that intended by the producer, or the real value of the object in question; as shall be discussed below.

In order to explain value emergence for consumers, scholars link value to the idea of a trade-off – the individual thereby assesses which benefits are received at which cost or compared to which necessary sacrifices (Armstrong, Kotler, Trifts & Buchwitz, 2017; Grönroos & Voima, 2012; Shanker, 2012). It must be emphasised at this point that the costs of a product reach beyond the factor of price. Value is often equated with monetary value and respectively associated with the concept of 'value for money' (Zeithaml, 1988). This strongly limited understanding of such a complex construct, however, would again

only allow for a one-dimensional analysis.

Upon assessing the described trade-off as either beneficial or disadvantageous, consumers may accordingly arrive at a positive or at a negative evaluation of the object in question, referred to as polarity. It is further suggested that each value perception may be of a varying degree of intensity, with the term valence referring to the intensity of the polarity experienced (Frondizi, 1971). Objects are thereby not evaluated in isolation but on a comparative basis (Holbrook, 1999; Johnson, Herrmann & Huber, 2006; Wagner, 1999), in other words the benefits and costs tied to the object in questions are assessed "relative to those of competing offers" (Armstrong, Kotler, Trifts & Buchwitz, 2017, p. 15). This enables the individual to classify an object as superior, inferior or potentially equal to other alternatives (Lanning, 2000) and hence value is seen also as a **judgement of preference** (Holbrook, 1999).

2.3.2.1 Perceived Value and Why 'It Depends'

> "value is relative by virtue of its comparative, personal, and situational nature"
> (Sánchez-Fernández & Iniesta-Bonillo, 2007, p. 427)

Value perception as such is influenced by consumers' **level of involvement** with the object in question (Solomon, Bamossy, Askegaard & Hogg, 2016) and accordingly for the purpose of this thesis the product categories '**high involvement**' and '**low involvement**' shall be distinguished. Involvement thereby refers to the relevance of the object (Zaichkowsky, 1985) for an individual. A consumer's degree of involvement may "[range] from absolute lack of interest in a marketing stimulus at one end to obsession at the other" (Solomon, Bamossy, Askegaard & Hogg, 2016, p. 209).

It follows naturally that perceived value is considered highly **subjective** (Armstrong, Kotler, Trifts & Buchwitz, 2017; Woodruff, 1997; Zeithaml, 1988). Consumer value of any type is established by the individual throughout the consumption process (Holbrook, 1999; Rindova & Petkova, 2007), "[encompassing] the entire experience of perceiving, evaluating, and judging an object" (Wagner, 1999, p. 128). It requires the consumer to interact in some way with the object in question (Anker, Sparks, Moutinho & Grönroos, 2015), rendering value emergence subject to a process of co-creation (Anker, Sparks, Moutinho & Grönroos, 2015; Grönroos & Gummerus, 2014; Komulainen, Mainela, Tähtinen & Ulkuniemi, 2007). In such a constellation "value depends on the characteristics of some physical or mental object but cannot occur without the involvement of some

subject who appreciates these characteristics" (Holbrook, 1999, p. 6), ergo value emergence is dependent on a consumer's experience of it (Lanning, 2000).

Additional to the subjective nature of perceived value, a consumer's experience with a given object and the resulting evaluation of it is very much **context-dependent** (Babin, Darden & Griffin, 1994; Parasuraman, 1997). Holt argues that value perception depends on the underlying purpose of consumption (Holt, 1995), supported by authors claiming value recognition to be tied to situational need fulfilment (Wagner, 1999; Woodruff, 1997), or satisfaction (Hassenzahl, 2004; Sweeney & Soutar, 2001). Satisfaction, as "companion construct" (Parasuraman, 1997, p. 155) of value, is achieved when the realised value of an object positively matches or even exceeds the value expected by the consumer (Flint, Woodruff & Gardial, 1997; Komulainen, Mainela, Tähtinen & Ulkuniemi, 2007; Laws, Prideaux & Moscardo, 2006). Using Kano's model of Customer Perception (Khalifa, 2004), object features may be categorised according to their potential to increase consumers' level of satisfaction and in turn the perceived value of an object (see Appendix E).

As a result of the complexity of the value construct itself and the intricacies of value formation among consumers, especially in the creative industry businesses face high **value and demand uncertainty**, or the so-called 'nobody knows' principle (Caves, 2002). As cited in Levickaitė (2011), "consumer reaction to a creative product is neither known beforehand, nor easily understood afterward" (p. 85). And as Wilf (2014) adds, "objects and people that are deemed exemplary of creativity, and hence valuable, often cannot [objectively] be distinguished from objects and people excluded from this category" (p. 404). The involvement of technology into creative process holds the potential of increasing the unpredictability of consumer reaction and evaluation.

2.3.2.2 AI-Technology and Value

Among other economic effects (see section 2.2.1.1), Artificial Intelligence is said to redefine the concept of value creation and transform also the means of value delivery (Armstrong, Kotler, Trifts & Buchwitz, 2017). And while one of the objectives underlying the development and application of Artificial Creativity is the "production of increasingly higher valued artefacts" (Colton, Pease, Corneli, Cook & Llano, 2014, p. 137), whether the increasing involvement of such a technology will ultimately have such a positive rather than a negative impact on creative products and process remains unclear.

What experts do appear to agree upon is that consumers are highly unlikely to attribute value to creative objects so high in novelty that they fit no existing mental scheme of categorisation (Boden, 2004; Rindova & Petkova, 2007; Sternberg, Kaufmann & Pretz, 2001) – "the uncertainty with regard to the value-creating potential of product innovations increases with their technological novelty" (Rindova & Petkova, 2007, p. 217).

Consumer segmentation is recommended as one strategy to combat the lack of predictability of perception and valuation (Andrews, Drennan & Russell-Bennett, 2012; Bowen & Morosan, 2018). Apart from **gender** (men may be more likely to accept technological innovation than women, see Tellis, Yin & Bell, 2009; Weber Shandwick, 2016), **age** group (younger generations may be more likely to accept technological innovation, see Bowen & Morosan, 2018; Goasduff, 2018; Im, Bayus & Mason, 2003), **level of education** (those with higher levels of education may be more likely to accept technological, see Tussyadiah & Miller, 2018) and **cultural background** (An, 2017; Pfeiffer Consulting, 2018), consumers' **level of innovativeness** (De Marez, Vyncke, Berte, Schuurman & De Moor, 2007), **technological adoption behaviour** (Armstrong, Kotler, Trifts & Buchwitz, 2017) as well as any **previous exposure to Artificial Intelligence** or related objects (Parasuraman, 1997; Tussyadiah & Miller, 2018; Venkatesh & Bala, 2008) are presumed useful factors of consideration in the attempt to further the understanding of consumer valuation of Artificial Creativity.

AI technology itself, with its in many other cases promising ability of extensive data analysis, provides little remedy for businesses on this quest – "there is no guaranteed algorithm for recognizing which new ideas or products will come to be valued and which will not" (Sternberg & Lubart, 1992, p. 2).

2.4 Conceptual Framework and Research Gap

The review of available literature on the topics as found above has not only repeatedly uncovered complex constructs and on-going scientific debates, it has also lead to the discovery of two large shortcomings of current research.

Firstly, while Artificial Intelligence is seen by many as a highly significant technological advancement and its impact on various aspects of Consumer Behaviour is considered "an area ripe for research" (Peck & Webb Luangrath, 2018, p. 246), scholars have pointed out a general lack of publications examining forms of human-computer collaboration, especially within the creative realm (Davis et al., 2014).

Additionally, most studies of creativity revolve around the creative product or output. To-

date few appear to focus on the actual creative process involved in generating these outputs (Lindauer, 2011; Pfeiffer Consulting, 2018), in defiance of early urges to avoid the isolated study of elements to creativity (Rhodes, 1961; Sawyer, 2013). And despite experts claiming that "what is known about the process that governed the creation of the work is just as important as the final product in determining its aesthetics and artistic value" (Chamberlain, Mullin, Scheerlinck & Wagemans, 2018, Factors Affecting Value, Aesthetic and Categorisation Judgments of Art, para. 1).
When these two research gaps collide, as they do with regard to Artificial Creativity and the resulting **involvement of AI in the creative process**, the aforementioned lack of understanding and consensus becomes even more significant.

Previous studies in this field have reported partly contradicting findings. Some researchers found participants to value computer-generated art less than that produced by humans (Chamberlain, Mullin, Scheerlinck & Wagemans, 2018). Other studies were able to confirm these tendencies, noting additionally that a converse labelling of outputs had no impact on preference judgments by participants (Moffat & Kelly, 2006). In other words, labelling a computer-generated piece of art as human-made did not increase participants' perception of it. Such findings imply that consumers' evaluation of creative products does not depend on the available information about the creative process and about the integration of technology into this process but rather on the output characteristics themselves (Jordanous, 2017). Jordanous (2017), however, also concluded participants to be less confident in evaluating the level of creativity of systems when assumed to be co-creative rather than fully autonomous. Somewhat opposed to the assumption that it is merely the output itself not the narrative surrounding the creative process that determines consumers' value perception, stands, among other academic work (Boden, 2004), a study in which participants were unable to correctly distinguish – based purely on such a creative product – whether it involved Artificial Intelligence or only human effort. These scholars also found, while claiming no statistical significance, computer-generated art to be rated more positively than its human counterpart (Elgammal, Liu, Elhoseiny & Mazzone, 2017).

Figure 2.6 Conceptual Framework

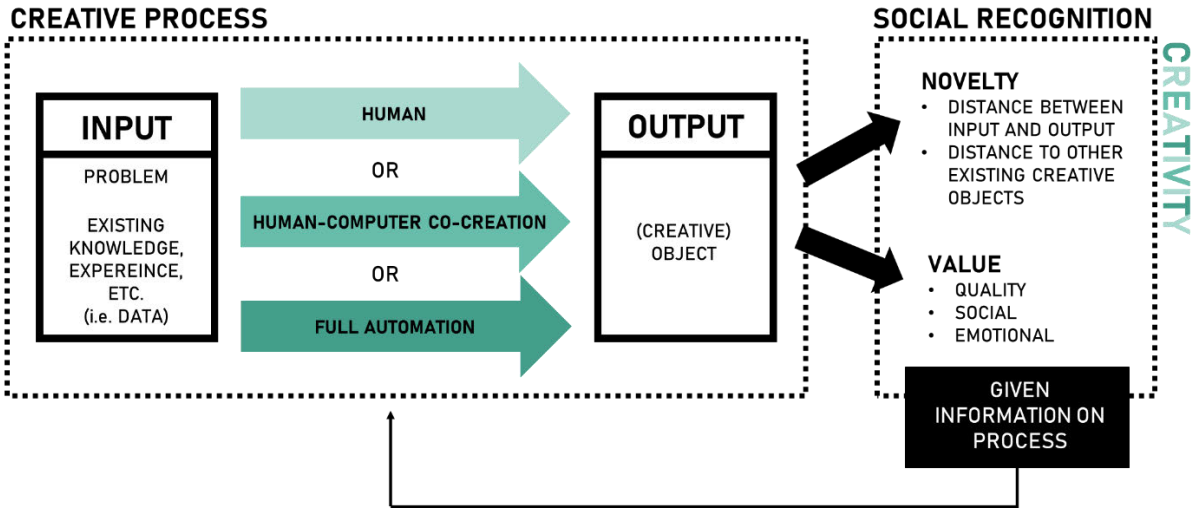


Figure 2.6 Conceptual Framework (developed by the author based on section 2.1 – section 2.3)

Guided by the conceptual framework (Fisher, 2007) as displayed above, established on the basis of the most relevant insights gained throughout the literature review, the following study shall consider not only the two extremes of exclusively human creativity versus the full automation of creative processes; as observed for most available studies on Artificial Creativity. It shall also include the hybrid concept of human-computer co-creation.

Therefore, this thesis with the following research study aims to investigate to which extent the narrative of the degree of involvement of Artificial Intelligence in creative processes may affect consumers' output perception and attribution of creativity – measured by the two defining characteristics of perceived novelty and value, and examined for both high as well as low involvement creative products.

2.4.1 Context: Music and Musical Composition

For the purpose this thesis, the theoretical model shall be applied to the context of music. The music industry is considered on one the core industries of the creative sector (see section 2.2.1.1), with recorded music yielding global revenues of USD 18.9 billion to USD 26.7 billion in 2018 – depending on the source consulted (Mulligan, 2018; PricewaterhouseCoopers International, 2019; Sweney, 2019).

Music is, as a form of creative expression, also considered a social phenomenon (Marshall, 2018; Rentfrow & Gosling, 2003). Characterised by scientists as ubiquitous (Rentfrow & Gosling, 2003), evidence of musical expression has been traced to every known society and historical period (Lowis, 2011). Like language, it is considered a tool for coordination and communication (Gardner, 2011; Sawyer, 2013) and apart from its social function is

also of high relevance to the individual and the concept of self-identity (Maslow, 1943; Rentfrow & Gosling, 2003). Scholars have thereby detected the exposure to the respectively preferred style of music to activate the same brain regions as other highly pleasurable stimuli, such as food, sex or drugs (Blood & Zatorre, 2001).
The musical composition process, as outlined by Bamberger (1977) encompasses the establishment of melodies and musical themes according to the underlying compositional motivation, before the artist may move to "small-scale editing" (Collins, 2005, p. 9) and the final evaluation of coherence and musical consistency (Collins, 2005). It offers, with regard to Artificial Creativity, numerous possibilities of technological involvement (see Appendix F) – from a source of inspiration (Marshall, 2018) and the execution of assistive tasks such as pitch and tempo recognition, to co-creative arrangements and even up to full automation of musical composition (Deahl, 2018; Fiebrink & Caramiaux, 2018; Marshall, 2018) Artificial Intelligence has continuously expanded its presence in the music industry (Deam & McLean, 2018) – wherefore music appears a suitable context for the following study.

3. Research Methodology

This chapter will outline the methodological considerations guiding the collection of primary data for this thesis project – aimed at investigating how consumers' perception and valuation of creative products may be influenced by information provided on the degree of involvement of Artificial Intelligence in the creative process.
The sectional structure is aligned with scientific standards as outlined in various academic publications (Saunders, Lewis & Thornhill, 2016).

3.1 Research Philosophy, Design and Approach Adopted

As pointed out earlier, research into creativity can be approached from at least four different angles, and to-date has seen contributions from a variety of scientific disciplines, allowing researchers large methodological flexibility (Solomon, Bamossy, Askegaard & Hogg, 2016). For this thesis, many of the choices regarding the study's planning and execution can be traced back to its underlying **realist research philosophy**. As a deviation from the extreme of positivism, realist research shares the focus on the establishment of "systematic knowledge" (Fisher, 2007, p. 15); yet it does so while acknowledging a certain level of subjectivity in the process (Bryman & Bell, 2011; Smith, Todd & Waldman, 2009).

> "We think that social phenomena exist not only in the mind but also in the objective world – and that some lawful and reasonably stable relationships are found between them. The lawfulness comes from the regularities and sequences that link together phenomena. From these patterns we can derive constructs that underlie individual and social life"
>
> (Miles & Huberman, 1994, p. 5)

In coherence with its underlying philosophical stance – realism is often associated with cause-and-effect research (Fisher, 2007) – the following study is designed with an **explanatory** intention (Saunders, Lewis & Thornhill, 2016). Previous exploratory and descriptive research efforts geared towards Artificial Creativity and value perception have already uncovered possibly relevant elements for further analysis and thereby established first concepts within these complex fields, many of which were discussed in the literature review above. They have paved the way for explanatory studies to attempt to determine "causal relationships between variables" (Saunders, Lewis & Thornhill, 2016, p. 176). The causality of interest for this thesis is between the information provided to consumers on the degree of AI involvement in the creative process and the effect it may have on their respective output perception and valuation.

As to-date few publications have dealt with the analysis of similar topics (see section 2.4), the existing body of research provides no substantial ground for hypothesis formation. Therefore, this thesis shall follow an inductive approach, with data collection preceding any theoretical conceptualisations (Saunders, Lewis & Thornhill, 2016).

3.2 Research Method Applied

Given the explanatory research aim of this thesis, an **experiment** is chosen as the mono method for primary data collection (Fisher, 2007). It allows the researcher "to study the probability of a change in an independent variable causing change in another, dependent variable" (Saunders, Lewis & Thornhill, 2016, p. 178) and is considered suitable for the research in the fields of creativity (Ma, 2011) and Artificial Creativity (Karimi, Grace, Maher & Davis, 2018).

As stated in section 2.4 this study shall be applied to a musical context and examine the phenomenon in question for both a high involvement product (Q1 – a pop song) and a low involvement product (Q2 – a soundtrack used in a promotional clip) Hence the experimental variables shall be defined as follows.

The **independent variable** refers to the **narrative** provided to the participant. The narrative contains information on the musical composition process. This variable is subject to manipulation (Ma, 2011), outlining the creative process as either performed only by a human artist (N1), through human-AI co-creation (N2), or as fully automated (N3) – resulting in three **experimental conditions** (Field & Hole, 2013). This manipulation allows for the measurement of the effect the presented narrative has on participants' perception and valuation, i.e. on the dependent variable (Fisher, 2007; Newell & Goldsmith, 2001).

In order to avoid falsification of the cause-and-effect relationship in data analysis, the experiment considers three **covariates**, namely participants' **familiarity** with the product presented, their **liking** of it as well as the participants' level of **technological involvement**. These three are identified as "phenomena that might cause some of the variation observed in the dependent variable" (Gill & Johnson, 2002).

The **dependent variables** (Saunders, Lewis & Thornhill, 2016) of interest to this study are thereby participants' evaluation of **novelty –** measured as product novelty and process novelty, and **value –** measured as quality, emotional value and social value of the product – identified earlier as defining characteristics of creativity. Additionally, participants' perception of the artist's **level of expertise** are measured.

Lastly, the importance of **control variables** must be recognized (Saunders, Lewis & Thornhill, 2016) – across all three experimental conditions the participants are exposed to the same high involvement (Q1) and low involvement (Q2) creative product to again avoid data falsification and facilitate data comparability.

The **quantitative data** generated for each case is recorded using a self-completed questionnaire (Fisher, 2007; Smith, Todd & Waldman, 2009) – a "[method] of data collection in which each participant is asked to respond to the same set of questions in a predetermined order" (Saunders, Lewis & Thornhill, 2016, p. 437). Integrated into the experimental set-up, this pre-coded tool enables subsequent statistical data processing and within-group as well as across-group data comparison (Bryman & Bell, 2011; Fisher, 2007).

3.2.1 Measurements Used in Experiment

The dependent variables and covariates to this experimental approach are all designed as rating questions in matrix form (Saunders, Lewis & Thornhill, 2016) for which the participants are asked to "rate or evaluate [the concept in question] according to a carefully

graduated scale" (Fisher, 2007, p. 194). Value, as one dependent variable of interest, is measured with statements referring to the three types of value identified in the literature review (see section 2.3.1). The items for quality (3 items) and social value (4 items) are extracted from the work of Sweeney & Soutar (2001), adapted to exclude any reversed items. Emotional value (5 items) is measured based on Petrick (2002). For all three types of value the items were slightly adapted in wording to suit the context of this study.
Novelty is measured with regard to the creative product and also with regard to the creative process of composition, as described to the participants in the respective narrative. For both questions the same 5-item scale is used (Bruner, 2009, p. 658). The scale provided to measure the expertise of the producer(s), as perceived by the participants – again based on the narrative provided – is also adapted from Bruner (2009, p. 370).
The covariates familiarity and liking are measured as single-item scales in this study, as they have been in previous publications (Newell & Goldsmith, 2001; Norton, Frost & Ariely, 2007). Given that these are basic constructs, the use of single-item rather than multi-item scales is deemed acceptable (Bergkvist, 2014; Bergkvist & Rossiter, 2007; Rossiter, 2011). Participants' general involvement with technology is measured in a 3-item scale (Bruner, 2012, p. 394).
For all questions relating to the dependent variables or covariates participants are provided verbal anchors for a 5-point Likert scale, as "commonly used to ask people about their opinions and attitudes" (Fisher, 2007, p. 195).
Additionally, personal factual questions (Bryman & Bell, 2011) are included to gather demographical data on participants' gender, age group and level of education.
The questionnaire used in the experiment has been attached as Appendix G.

3.2.2 Research Sample

The population relevant to a study as the one conducted for this thesis can be seen to encompass every consumer of creative products, or at least – supposing a contextual limitation – every consumer of music, in both high involvement and low involvement settings. It therefore becomes apparent that the size of the research population cannot be accurately measured. Hence, this piece of research relies on non-probability sampling (Bryman & Bell, 2011; Easterby-Smith, Thorpe & Jackson, 2015), where "the probability of each case being selected from the target population is not known" (Saunders, Lewis & Thornhill, 2016, p. 276). Given the complexity of the experimental setup and the time constraints on this research project, convenience sampling was used, implicating issues to

the generalisability of findings that must be considered in data analysis (Bryman & Bell, 2011).

With a sample size of **98 participants** (Experimental Condition 1: 32 cases, Experimental Condition 2: 32 cases, Experimental Condition 3: 34 cases), this study satisfies the available guidelines for non-probability sampling (Saunders, Lewis & Thornhill, 2016) and exceeds the norm of experimental research (Field & Hole, 2013) as well as the sample sizes found in other comparable studies (Elgammal, Liu, Elhoseiny & Mazzone, 2017; Jordanous, 2017; Kantosalo, Toivanen & Toivonen, 2015; Moffat & Kelly, 2006).

3.3 Data Collection Process

The experiment was carried out on campus at the IUBH University of Applied Sciences in Bad Honnef, Germany, over a period of four days – from 17 September to 20 September 2019.

3.3.1 Experimental Procedure

The experiment was divided into two experimental tasks. Participants were explained the research purpose – limited to the experimental condition (see independent variable, section 3.2) they would be exposed to – and given any relevant instructions. For Task 1, participants were asked to read the provided narrative on the composition process of a song (Appendix H), then listen to the audio and answer the respective sections of the questionnaire. Upon completion participants directly moved on to Task 2. Following the same structure, they were asked to read the provided narrative on the composition process of a soundtrack (Appendix I), watch and listen to the promotional clip and subsequently answer the relevant questions.

Hereby the interaction with the researcher was limited to the provision of experimental instructions. The researcher in this case can be classified as visible (Fisher, 2007), yet not involved and externalised from the population group for the purpose of this study (Saunders, Lewis & Thornhill, 2016; Smith, Todd & Waldman, 2009).

The duration of each experiment, including both tasks, ranged from approximately 7 to 20 minutes.

3.3.2 Instruments and Equipment Used

Across all three experimental conditions, so regardless of whether the narrative outlined either human creation, human-AI co-creation or full automation, the same song (Teryn Southern – ‘Genesis’, 0:51-1:50 min; Southern, 2018) in Task 1 and the same soundtrack

and advertisement (Mercedes-Benz – 'The Journey', 0:00-1:23 min; Mercedes-Benz, 2012) in Task 2 were presented to participants. The commercial video clip was cut to avoid a display of the company logo, so that participants' brand perception would not influence their evaluation of the creative product. The duration of exposure to the musical stimuli was chosen in reference to similar studies (Baroni, 2006). The advertisement was displayed to each participant using an IPad and every participant was asked to use the provided Apple Earpods to listen to both song and soundtrack in order to guarantee a consistent level of audio quality across the sample (Field & Hole, 2013; Saunders, Lewis & Thornhill, 2016).

3.4 Validity and Reliability

> "Researchers employing quantitative research methods should keep reliability and validity of measurement of creativity in mind to eliminate the measurement errors as much as possible"
>
> (Ma, 2011, p. 304)

Validity refers to the general "appropriateness of the measures used" (Saunders, Lewis & Thornhill, 2016, p. 202) in the respective study. This section will consider four types of research validity (Bryman & Bell, 2011; Saunders, Lewis & Thornhill, 2016).

Construct or measurement validity infers that the statements and constructs used to collect primary data accurately reflect the phenomenon being researched, or as phrased by Fisher (2007), whether they "actually measure the thing they are said to measure" (p. 295). Realist research is at times criticised for allegedly oversimplifying complex constructs and therefore risking the measures' validity (Fisher, 2007). To this regard, the biggest concern for the study design at hand would concern whether perceived novelty and perceived value are indeed appropriate constructs for the measurement of perceived creativity. A thorough literature review (see section 2.1), however, does clearly indicate that these are the two main defining characteristics of creativity and are therefore deemed appropriate and valid measures.

Internal validity is met if in data analysis and interpretation the researcher "accurately demonstrates a causal relationship between two variables" (Saunders, Lewis & Thornhill, 2016, p. 203). The variables for this research have been defined to include also two covariates or cofounding variables that could possibly affect the relationship between independent and dependent variable and must be controlled for to allow accurate findings (see section 3.2). It must be acknowledged though that this experiment was not performed under laboratory conditions (Easterby-Smith, Thorpe & Jackson, 2015; Saunders, Lewis &

Thornhill, 2016). Therefore, the internal validity of this study might be compromised through unidentified variables affecting participants' performance and hence data results.

External or population validity assesses "whether the generalisations or interpretations that a researcher has proved in a particular context apply equally well to other populations or other contexts" (Fisher, 2007, p. 297). In other words, it refers to the generalisability of findings. While realist research does commonly aim for such generalisable conclusions (Fisher, 2007), the non-probability sampling technique applied in this case (see section 3.2.2) as well as the focus on one specific creative context (see section 2.4.1) render the external validity of the findings questionable. Hence this thesis shall conform with scholars' recommendations to base the assessment of transferability of findings on personal judgment, as the sample size and sampling technique in such cases do not allow for statistical backing (Fisher, 2007; Saunders, Lewis & Thornhill, 2016).

Ecological validity is the last type of validity to be considered here. A study can be deemed ecologically valid if "findings obtained from contrived circumstances have validity in the messy complexity of real life" (Fisher, 2007, p. 298). And while the experiment for this thesis was, as stated with regard to internal validity, not carried out under laboratory conditions, participants performance in such a research setting might still not mirror people's natural consumption and evaluation behaviour (Gill & Johnson, 2002). Therefore, anyone wishing to transfer the following findings to natural consumption scenarios is advised to consider this limitation.

Reliability of a study is given if the data collection can be replicated and the data generated for such a replication is consistent with that of the original study (Saunders, Lewis & Thornhill, 2016). It must be recognised that participant error and participant bias (Saunders, Lewis & Thornhill, 2016) are two threats to research reliability that cannot be outright eliminated by the researcher. However, the experiment performed in this thesis is considered not to have provided participants with any incentive to purposefully answer incorrectly (participant bias). The occurrence of participant error, through fatigue, distraction or other factors, was counteracted where possible by keeping the questionnaire concise or selecting a suitable location and setting. Additionally, the researcher is aware and cautious of researcher error, or "any factor which alters the researcher's interpretation" (Saunders, Lewis & Thornhill, 2016, p. 203) and naturally refrains from purposefully falsifying the recorded data or its interpretation, eliminating the threat of researcher bias (Saunders, Lewis & Thornhill, 2016).

3.4.1 Reliability of Applied Constructs and Scales

Prior to data analysis, the reliability of the applied multi-item scales shall be examined. For this purpose, Cronbach's Alpha, "by far the most popular measure of internal consistency" (Sarstedt & Mooi, 2019, p. 280), is calculated for each construct composed of a multi-item scale, with regard to both the high (Q1) as well as the low involvement (Q2) product group. This value is used "to measure the consistency of responses to a set of questions (scale items) that are combined as scale […] to measure a particular concept" (Saunders, Lewis & Thornhill, 2016, p. 451).

Table 3.1 Cronbach's Alpha for Multi-Item Scales

	Value			Novelty			
	Quality	Emotional Value	Social Value	Product Novelty	Process Novelty	Level of Expertise	Technological Involvement
Q1	.650 (*)	.903 (*)	.769 (*)	.665 (**.672)	.816 (*)	.657 (**.662)	.165 (**.405)
Q2	.797 (*)	.898 (*)	.857 (*)	.827 (*)	.856 (**.858)	.619 (**.629)	

(*): Cronbach's α would not improve with item deletion
(**): Cronbach's α improvement through deleting one item of the score; refers to different items respectively

The value- and novelty-related scales as well as the scale for measuring participants' perception towards the level of expertise of the artist(s) shall be considered reliable, as scholars agree on Cronbach's Alpha values of above .6 or .7 to be acceptable (Field, 2018; Sarstedt & Mooi, 2019). However, with a Cronbach's $\alpha = .165$, the measurement scale for participants' level of technological involvement is deemed highly unreliable. An analysis indicated this value may be improved to Cronbach's $\alpha = .405$ by deleting the item 'Technology appeals to me', which would still be considered insufficient. A calculation of Pearson's correlation coefficient for the remaining two items of the scale, with $r = .263$, further showed these to be only weakly correlated (Field, 2018; Sarstedt & Mooi, 2019) with one another, resulting in the exclusion of this covariate from the subsequent data analysis due to lack of reliability of its measurement.

3.5 Ethical Considerations

Prior to starting the first experimental task each participant was made aware that by partaking in this study they were giving their informed consent to data collection, data storage and the anonymised use of generated data (Fisher, 2007; Saunders, Lewis & Thornhill, 2016). The research design required the use of **deception** (Fisher, 2007), as the experimental focus would not allow the researcher to disclose the true purpose of this study and thereby the existence of three experimental conditions. Adopting a teleological view (Saunders, Lewis & Thornhill, 2016), it is deemed acceptable "to limit participants'

understanding of what the research is about so that they respond more naturally to the experimental treatment" (Bryman & Bell, 2011, p. 137). This research conduct caused no harm to participants and the collected data has not been and is not intended to be used for any harmful purpose (Fisher, 2007; Saunders, Lewis & Thornhill, 2016).

4. Primary Research Findings

In line with the overriding research aim, the objective of primary research for this thesis is to collect data on participants' value and novelty perception towards a musical product as well as on the level of expertise attributed to the artist(s). This is done over three experimental conditions, in which the composition process is explained to the participant either as human-centred (N1), as achieved through human-AI co-creation (N2) or as fully automated (N3). Each experimental condition thereby includes data collection for a high involvement (Q1: song) and a low involvement product (Q2: soundtrack).

The following report of findings shall include a within group-analysis and an across-group analysis (Field & Hole, 2013). For the **within-group analysis** the effect of the manipulation of the independent variable on the dependent variables of interest is measured while controlling for the two identified covariates (Figure 4.1). This analysis is performed separately for each product group (Q1; Q2). The **across-group analysis** compares the data collected for all dependent variables between the two product groups (Q1; Q2) for each of the three experimental conditions (Figure 4.2).

4.1 Descriptive Statistics – Demographics and Sample Structure

The experimental data is based on a sample of 98 participants, nearly evenly distributed over the three experimental conditions. The majority of participants (80.61%) is between 18 and 25 years of age. For more details on the sample group, please see Appendix J.

Table 4.1 Sample Structure – Brief Overview

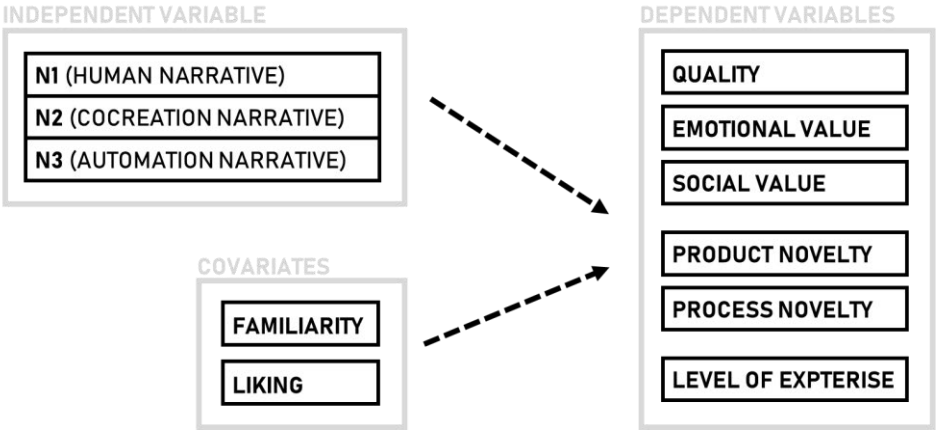
	Total	N1	N2	N3
Total number of participants	98	32	32	34
Male	62	22	19	21
Female	36	10	13	13

4.2 Data Analysis – Within-Group and Across-Group Comparisons

For the **within-group comparison**, an analysis of covariance (**ANCOVA**) is performed (Fisher, 2007). It allows the researcher to control for the effect of covariates when measuring the effect of manipulation of the independent variable on the dependent variables in question (Field, 2018).

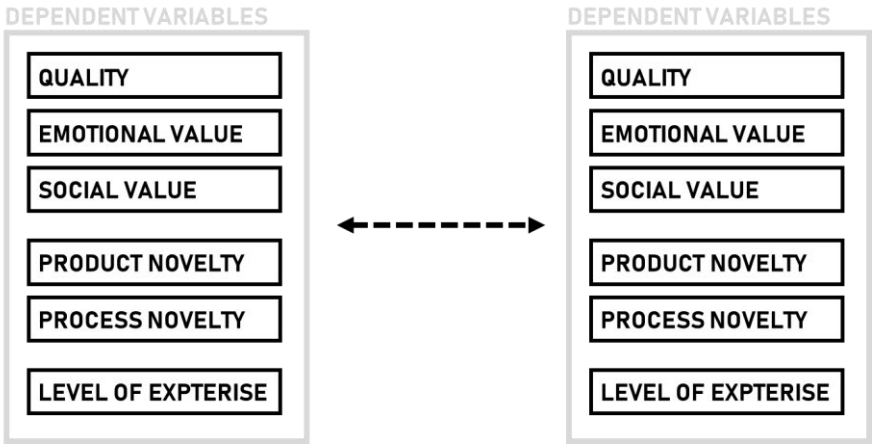
The purpose of applying the ANCOVA to the primary data collected for thesis is to investigate whether, if controlling for the effect of participants being familiar with the song or soundtrack presented and controlling for the effect of their liking or dislike towards either product, there is a significant difference in how participants perceive and evaluate the products, depending on which narrative they are provided. In other words, whether their perception of quality, value and the artist's level of expertise is influenced by the degree of involvement of Artificial Intelligence in the creative process.

Figure 4.1 Within-Group Analysis



The findings of the ANCOVA in the within-group analysis are complemented by a **paired samples t-test**, enabling an **across-group comparison** (Figure 4.2). The purpose of this statistical test is to determine whether the scores for the constructs in question, the dependent variables, differ significantly between the two product groups of high and low involvement for each experimental condition (Field, 2018; Sarstedt & Mooi, 2019).

Figure 4.2 Across-Group Analysis



In the following subsections, the dependent variables to this analysis will be examined individually, contrasting the findings for the high and low involvement product group.

4.2.1 Testing for Independence between IV and Covariates

Following the guidelines set by Field (2018), the ANCOVA is preceded by the confirmation of the independence of the covariates from the independent variable. For this, an analysis of variance (ANOVA) is conducted (Table 4.2). It shows that across all experimental conditions (N1, N2, N3), for both the high (Q1) and the low involvement product (Q2), the average scores for the covariates 'familiarity' and 'liking' do not differ statistically significantly. It can be said that participants' ratings of familiarity with and liking of the song or soundtrack thereby are not significantly influenced by the narrative presented to them.

Table 4.2 Analysis of Variance – Independent Variable and Covariates

		Covariate: Familiarity		*	Covariate: Liking		*
		Mean	ANOVA		Mean	ANOVA	
Q1	N1	1.7813	p = .230 → not significant		3.2500	p = .843 → not significant	
	N2	1.9063			3.3750		
	N3	2.2353			3.2059		
Q2	N1	1.7816	p = .078 → not significant		3.9063	p = .210 → not significant	
	N2	2.0000			3.4839		
	N3	2.4412			3.8235		

* for additional values, relevant to statistical reporting (df between/within groups, F), see Appendix K

This confirmation of the independence between the independent variable and the covariates is not a statistical requirement but does, however, aid in the interpretation of the subsequent ANCOVA results (Field, 2018).

4.2.2 Dependent Variable: Quality

The analysis of covariance for the dependent variable of perceived quality reveals that participants' quality perception is not significantly influenced by their familiarity with the song (p = .559) or with the soundtrack (p = .088). Whether participants like or dislike the song (p = .002) or soundtrack (p = .005), however, predicts statistically significantly their quality evaluation of either product. For both product groups, liking the product and the quality perception of it are of a positive, weak correlation (r_{Q1} = .317; r_{Q2} = .286). Once the effect of liking on quality scores is controlled for and removed, the **effect of the narrative on participants' quality perception is non-significant** for both product groups; for Q1 F(2,93) = .399, p = .672 and for Q2 F(2,92) = .243, p = .785.

So, while the data indicates that all participants, given the provided 5-point Likert scale, agree with the proposition of product quality for both products, it further proposes the assumption that on average participants rate the song or soundtrack highest for quality if presented as automated, second highest if presented as co-created and least highest if

presented as a human composition (see Appendix L1). However, regarding the latter assumption, no statistical difference can be reported among the experimental conditions.

Additionally, the slightly higher average of quality rating for the soundtrack, as low involvement product, compared to the song is found **not to be statistically significant** for any of the three experimental conditions (Table 4.3).

Table 4.3 Paired Samples T-Test: Quality

	Q1		Q2				
	Mean	SD	Mean	SD	t	df	Sig
N1	3.8125	.66633	4.0156	.62556	-1.852	31	.074
N2	3.8906	.52808	4.0313	.55105	-1.236	31	.226
N3	3.9167	.56594	4.1569	.60988	-1.816	33	.078

4.2.3 Dependent Variable: Emotional Value

The data collected on emotional value also shows no significant influence of the covariate familiarity on this dependent variable, neither for the high involvement ($p = .302$), nor for the low involvement musical product ($p = .732$). For both product groups, however, participants' liking of the musical piece is of highly significant influence on the emotional value perceived ($p_{Q1} = .000$; $p_{Q2} = .000$). Both variables are of moderate, positive correlation ($r_{Q1} = .555$; $r_{Q2} = .505$). Removing the covariate effect shows for both groups, once again, **no significant influence of the manipulation of narrative** on this dependent variable; for Q1 $F(2,93) = .378$, $p = .686$ and for Q2 $F(2,92) = .099$, $p = .905$.
Examining the calculated means, it shows participant scores are mostly rather neutral regarding the recognition of emotional value in the song or soundtrack (see Appendix L2). As stated above, the three narratives thereby hold no statistically significant difference in scoring.

If comparing both product groups, Q1 and Q2, only minor differences emerge in participants' scoring of emotional value for all three experimental conditions. Similar to the findings of quality, the scores for emotional value **do not differ significantly** between the high involvement and the low involvement product group (Table 4.4).

Table 4.4 Paired Samples T-Test: Emotional Value

	Q1		Q2				
	Mean	SD	Mean	SD	t	df	Sig
N1	3.2719	.86144	3.5438	.89908	-1.803	31	.081
N2	3.4250	.80282	3.2922	.67658	.755	31	.456
N3	3.4368	.83478	3.4765	.85708	-.197	33	.845

4.2.4 Dependent Variable: Social Value

Participants' perception of social value of the song and of the soundtrack analyses in the same pattern as the two previous types of value. Familiarity is also here identified as of no significant influence on the dependent variable (p_{Q1} = .535; p_{Q2} = .362), while liking is considered a highly significant confounding influence on social value (p_{Q1} = .000; p_{Q2} = .000) and positively correlated with it (r_{Q1} = .427; r_{Q2} = .373). Also in this case, controlling for the effect of the covariate reveals that **the effect of the narrative, or experimental condition, on this type of value is not statistically significant**; for Q1 F(2,93) = .043, p = .958 and for Q2 F(2,93) = .021, p = .979.

Considering the Likert scale provided for the two product evaluations, on average participants neither agree nor disagree to the presence of social value. And while upon first examination one might assume participants to attribute both products a slightly higher social value if presented as human composition (based on Adjusted Mean, Appendix L3), again these findings are not based on any statistical significance between narratives. However, after performing the t-test for across-group comparison, it shows that the **perception of social value differs significantly between the high and the low involvement product** for both the first [N1: M_{Q1}: 3.06, SD: .73 and M_{Q2}: 3.43, SD: 1.05, t(31) = -2.773, p = .009] and the third experimental condition [N3: M_{Q1}: 3.01, SD: .853 and M_{Q2}: 3.44, SD: .912, t(33) = -2.572, p = .015] (Table 4.5). Meaning, that participants attribute higher social value to the soundtrack than they do to the song if they are under the impression that both of these musical pieces are either fully automated (N3) or created solely by a human composer (N1).

Table 4.5 Paired Samples T-Test: Social Value

	Q1		Q2				
	Mean	SD	Mean	SD	t	df	Sig
N1	3.0573	.73123	3.4297	1.04964	-2.773	31	.009
N2	3.0781	.82603	3.2578	.68828	-1.075	31	.291
N3	3.0123	.85284	3.4363	.91173	-2.572	33	.015

4.2.5 Discussion – Value-Related Findings

When examining all three value-related constructs, the first point of discussion is that participants' familiarity with the presented musical piece has no statistically significant influence on any of the value constructs, regardless of product group (high or low involvement) or narrative. This might be considered expected, as the relevant literature provides no leads on previous product experience as a threat to value perception.

Whether participants like the presented product, however, does show a statistical significance in its influence on all value types measured here. This positive correlation between personal liking and positive valuation is coherent with the notion of value as a highly subjective judgement of preference (Holbrook, 1999; Woodruff, 1997), with scholars pointing out that value emergence necessitates a "positive experience" (Anker et al., 2015, p. 533) for the consumer. That liking as a covariate shows a stronger correlation to emotional value than to the other two value types thereby might be explained, on the one hand, by the intrinsic and self-oriented nature of emotional value (Holbrook, 1999). According to this typology (Appendix D), emotional value is categorised as much more personal than quality or social value may be. On the other hand, music's suitability for the communication of emotions (Lowis, 2011), might also facilitate this correlation.
Confirming the study by Moffat & Kelly (2006), the narrative on the creative process as a factor of manipulation shows no significant influence on value perceptions across the three experimental conditions. According to this data, whether the song or soundtrack are human compositions or technologically induced, has no significant effect on participants' evaluation. This finding is striking for two reasons. Firstly, it indicates that in this experiment the involvement of Artificial Intelligence in the creative process does not appear to trigger the Uncanny Valley Effect or related phenomena (see section 2.2.2.2). Secondly, despite creativity often portrayed as an exclusively human ability (see section 2.2), the absence of human influence in the creative process does not affect participants' value perception in this experiment.
Lastly, that social value is the only value type for which participants' scoring statistically significantly differs between the product groups high and low involvement, and additionally that participants rate the soundtrack as of higher social value than the song, is another interesting finding. That this significant difference in value perception is found for the experimental conditions including a human-centred narrative and one of full automation brings to mind a study by Jordanous (2017). This publication reported participants to be less confident about evaluation co-creative systems than non-collaborative processes. As this phenomenon is only measured of statistical significance for one of the value types considered, however, the present experiment holds insufficient evidence to support these claims.

4.2.6 Dependent Variable: Product Novelty

The analysis of covariance for the dependent variable of product novelty – while again finding 'liking' a statistically significant confounding variable and (p_{Q1} = .001; p_{Q2} = .023) and positively correlated (r_{Q1} = .255; r_{Q2} = .257) – also indicates that, for the high involvement product, the effect of familiarity with the song on participants' perception of product novelty is to be considered statistically significant [F(1,93) = 6.204, p = .015] and also weakly, negatively correlated (r = -.136). For participants' evaluation of the soundtrack's product novelty, familiarity has no statistically significant influence (p = .647). Controlling for the covariates' effects, the **manipulation of the narrative provided is of no statistical influence** on participants' perception and evaluation of product novelty; for Q1 F(2,93) = 1.125, p = .329 and for Q2 F(2,92) = 1.117, p = .332.
The collected data shows participants assume a fairly neutral position when questioned about the presence of product novelty, opting to neither agree nor disagree with the provided statements (Appendix L4). With regard to a second observation, namely that participants rate both products as the least novel when outlined as co-creative efforts, it must be emphasised, as pointed out above, that no actual statistical difference across the narrative was found for this dependent variable.

When cross comparing both product groups, Q1 and Q2, it shows that if under the impression of listening to a human-made composition, participants rate the soundtrack (M_{Q2}: 3.11, SD: .776) slightly higher for product novelty than the song (M_{Q1}: 2.86, SD: .555), t(31) = -2.247, p = .032. This **group difference is considered of statistical significance**. For the remaining narratives no significant difference is found between product groups (Table 4.6).

Table 4.6 Paired Samples T-Test: Product Novelty

	Q1		Q2				
	Mean	SD	Mean	SD	t	df	Sig
N1	2.8562	.55471	3.1109	.77603	-2.247	31	.032
N2	2.7219	.69688	2.8250	.68862	-.712	31	.482
N3	2.8721	.71363	2.9059	.74384	-.341	33	.736

4.27 Dependent Variable: Process Novelty

Similar findings to those of the ANCOVA considering product novelty are made for this analysis when focusing on process novelty. Liking, as for all previous dependent variables is considered a covariate of statistically significant influence (p_{Q1} = .019; p_{Q2} = .005) and

weakly, positively correlated (r_{Q1} = .171; r_{Q2} = .273). Perceived process novelty for the high involvement product, the song, is also statistically significantly influenced by and weakly, negatively correlated (r = -.092) with participants' familiarity with this song (p = .031). This does not hold true for the product of low consumer involvement, the soundtrack (p = .901). When controlling for and removing the respective effects of the covariates, **the effect of the narrative on participants' perception of process novelty is significant for both product groups**; for Q1 F(2,93) = 8.398, p = .000 and for Q2 F(2,92) = 4.932, p = .009.

Accordingly, it is considered statistically significant that participants exposed to a narrative outlining full automation perceive the composition process of both product groups as more novel, than those given to understand the song was co-created by a human artist and Artificial Intelligence. Those rating the process novelty lowest across all experimental conditions are the participants who were presented an exclusively human narrative of the composition process (Appendix L5). On average, all participants did, however, remain fairly neutral towards with the presence of product novelty, positioning themselves either as in agreement with the statements concerning this dependent variable or as neither in agreement nor in disagreement with them, considering the 5-point Likert scale.

Performing the t-test for across-group comparison shows that the perception of process novelty **differs significantly between the high and the low involvement product** for both the first [N1: M_{Q1}: 2.77, SD: .57 and M_{Q2}: 3.01, SD: .797, t(31) = -2.089, p = .045] and the third experimental condition [N3: M_{Q1}: 3.36, SD: .86 and M_{Q2}: 3.59, SD: .67, t(33) = -2.391, p = .023] (Table 4.7). Interpreting these findings, it can be stated that participants attributed higher process novelty to the soundtrack than they did to the song if they were under the impression that both musical pieces were either the work of a human composer (N1) or the result of full automation (N3).

Table 4.7 Paired Samples T-Test: Process Novelty

	Q1		Q2				
	Mean	SD	Mean	SD	t	df	Sig
N1	2.7656	.56603	3.0125	.79667	-2.089	31	.045
N2	3.3500	.74661	3.2344	.90682	.780	31	.441
N3	3.3647	.85489	3.5941	.66876	-2.391	33	.023

4.2.8 Discussion – Novelty-Related Findings

Linking to the prior discussion of value-related findings, it follows that as the second defining element of creativity identified in the literature, novelty is also reliant on social

validation (see section 2.1.1), i.e. a subjective phenomenon. The perception of this dependent variable therefore is naturally found to be influenced by participants' liking of or dislike towards the creative product in question.

Given the definition of novelty as the distance between an idea or product created and other ideas or products already existent (Bringsjord & Ferrucci, 2000; Stein, 1974), it was further to be reckoned with that if participants felt the presented product to be somewhat familiar, this would negatively affect their novelty perception. However, a finding that stands out in this context is that this influence of familiarity on novelty perception is only measured with reference to the song, not the soundtrack, i.e. the influence of this covariate is only of statistical significance for the high involvement product considered in this experiment.

A second striking difference found in this section of data analysis is that the effect of the narrative on participants' novelty perception is limited to the aspect of process novelty. For both the song and the soundtrack participants overall agree to the presence of process novelty if either product is presented as the result of automation. They remain undecided in their scoring of this construct (point 3 of 5 on Likert scale) when the composition is outlined as human-driven or co-created, with the latter of these two receiving on average slightly higher ratings. Hence, contrasting all three experimental conditions, it appears while participants perceive automation of musical composition as a novel process, the involvement of a human element – even if in collaboration with technology – neutralises the attribution of this novelty type.

4.2.9 Dependent Variable: Level of Expertise

For the last dependent variable included in the experiment, perceived level of expertise of the artist(s) involved in the composition process, 'liking' is also considered a statistically significant covariate ($p_{Q1} = .019$; $p_{Q2} = .012$) of weak, positive correlation ($r_{Q1} = .217$; $r_{Q2} = .272$). Familiarity is only found of significant influence with regard to the low involvement product ($p = .050$) – to which it is weakly, positively correlated ($r = .227$), not with regard to the high involvement product considered in this study ($p = .256$). Removing the covariate effect, **the manipulation of narrative is of no significant influence** on this dependent variable; for Q1 $F(2,93) = .229$, $p = .795$ and for Q2 $F(2,92) = .248$, $p = .781$. Therefore the finding that on average participants rate the artist's expertise highest for the song if supposedly composed by a human, followed by the co-creative narrative and lastly the narrative of full automation, lacks statistical significance. Similarly, for the data scores

for the soundtrack no significant difference among the experimental conditions is supported (Appendix L6).

An across-group analysis indicates that the ratings for perceived level of expertise of the artist **differ significantly between the high and the low involvement** product for the first [N1: M_{Q1}: 3.50, SD: .56 and M_{Q2}: 3.73, SD: .50, t(31) = -2.978, p = .006] and the third [N3: M_{Q1}: 3.37, SD: .69 and M_{Q2}: 3.81, SD: .66, t(33) = -3.728, p = .001] experimental condition respectively (Table 4.8). Participants exposed to the narrative of human work or that of a fully automated creative process considered the artist connected to the soundtrack composition to be possess slightly higher levels of expertise than the artist behind the composition of the song presented to them.

Table 4.8 Paired Samples T-Test: Level of Expertise

	Q1		Q2				
	Mean	SD	Mean	SD	t	df	Sig
N1	3.5000	.55520	3.7292	.49685	-2.978	31	.006
N2	3.5000	.57424	3.6146	.48718	-1.187	31	.244
N3	3.3725	.69031	3.8137	.66257	-3.728	33	.001

When discussing the data findings for this dependent variable, it should be noted that participants across experimental conditions generally appear to acknowledge the demonstration of expertise (point 4 of 5 on Likert scale). However, whether song or soundtrack were created by Artificial Intelligence or through human efforts, makes no statistically significant difference to the level of expertise participants attribute to the respective artist. Another interesting finding concerns the significant effect of liking on the perception of expertise, as outlined above. While scholars have indicated that extensive knowledge and related skills are considered requirements for strong creative expressions (Wilf, 2014; Zimbardo, Johnson & Weber, 2008), this experiment shows participants to not assess this construct as objectively as expected.

5. Conclusion

To provide an overview, the conclusion drawn from the primary data analysis for this experiment can be summarised to two main findings.

Firstly, and arguably of highest relevance to the research aim – the manipulation of the narrative provided to the participants is, with one exception, found of no statistically significant influence on product valuation, perceived novelty or expertise. The only construct, from those measured in this experiment, on which such a significant effect is

found is that of perceived process novelty.
Secondly, process novelty is then rated highest when participants are under the assumption that the song or soundtrack they were presented with was fully automated. The least novel process, accordingly, is perceived to be that of entirely human composition. Meaning that in the one case in which the narrative can be said to have influenced participants' scoring, the highest degree of AI involvement also sees the highest scores on the provided scale.

A third point that note is made of here concerns the finding that participants' evaluation compared across the two product groups, high involvement (song) and low involvement (soundtrack), is significantly different for three of the constructs measured – social value, process novelty and perceived level of expertise of the artist(s). These statistically significant differences between song and soundtrack rating are found either for the first or the third experimental condition, so for the human- or automation-related narratives. This infers that regarding the perception of a creative product's social value, its product and process novelty and the expertise attributed to the artist(s), it is of statistical significance that participants rate the low involvement product higher than the product of high involvement. A more extensive cross-comparative study of different product groups and varying level of consumer engagement is required for an accurate interpretation of this finding – which leads on to other recommendations for future research, pointed out in the following.

5.1 Limitations and Implications for Future Research

As indicated in the literature review, this thesis is concerned with three highly complex fields of research, in which for many core constructs no scientific consensus exists. The approach to primary data collection, analysis and interpretation in this work can therefore only be deemed appropriate for the chosen definitions and conceptualisations.
Two further limitations, of methodological nature, are those of generalisation and transferability. The sample analysed in this thesis, while considerably large compared to other experimental research of similar topics, cannot be claimed as representative of the vast target population. Hence the previous discussion of findings is limited to the group of participants. Any attempts to generalise the findings to the population of consumers of music may be inaccurate and is not advised until confirmed by additional research efforts in this direction. Similarly, the transferability of both the research design and the respective findings to other creative contexts as well as the trans-contextual consistency of data require further research.

Regarding the low involvement product used in the experiment, the soundtrack is part of a commercial clip, as stated earlier. And while the company logo and slogan were excluded from the sequence shown to participants to avoid the influence of brand perception falsifying data results, it must be noted that the advertisement does appear to be geared towards consumers' emotional decision-making. When attempting to replicate data results, this must be considered, as the commercial may have taken influence on participants' rating of emotional value or other constructs. Researchers conducting similar studies in the future may also wish to consider this limitation in their choice of product.

5.2 Industry Recommendations

Having noted the limitation to generalisation of findings due to the sampling technique employed and the resulting sample structure, this thesis nevertheless will conclude with the provision of two managerial implications considered relevant and insightful.

Given that this thesis found process novelty to be the only construct significantly influenced by participants' awareness of the degree of AI-involvement, the first implication is addressed to companies in the creative industry whose target customer has been proven, by additional research, to be wary of technological innovation, rather traditional and therefore opposed to extreme degrees of novelty. Should such businesses for economic reasons still wish to incorporate Artificial Intelligence into internal procedures, they are advised, according to the findings above, to design any process-related marketing around, of course either a fully human, or a human-AI co-creative narrative. The experiment reveals, at least for the sample group, that the involvement of a human element in the narrative presented, even if in combination with Artificial Intelligence, reduces the perceived process novelty.

In turn, for those creative businesses whose target customer is profiled as highly innovative and interested in technological advancements, the research findings of this thesis indicate that it may be advantageous for those businesses to clearly communicate the involvement of Artificial Intelligence in company's creative processes.

In conclusion of this thesis it can be said that this piece of research found no evidence to indicate that the involvement of Artificial Intelligence, of any degree, may diminish the value of a creative product or directly harm how it is perceived by consumers in any other way.

vii. References

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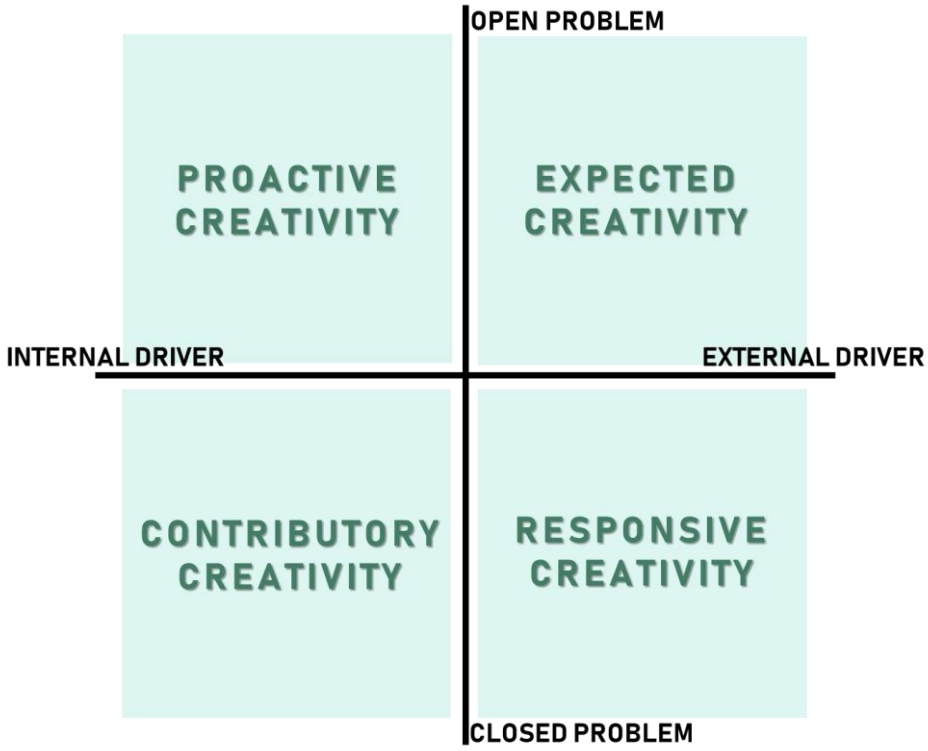
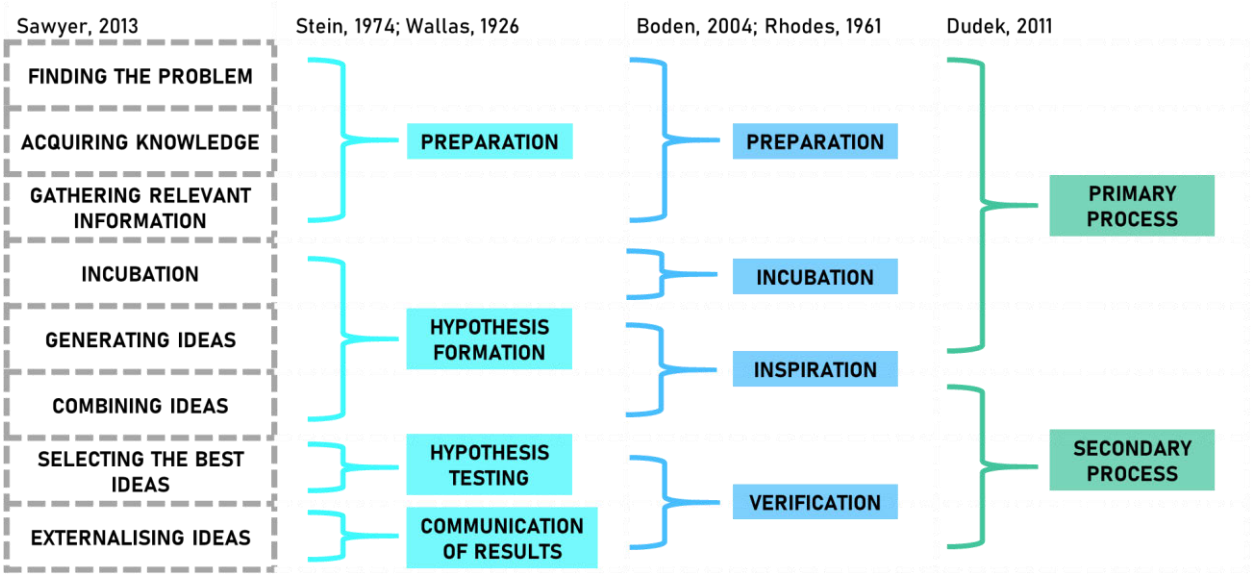
viii. Appendices

Appendix A Matrix of Creativity



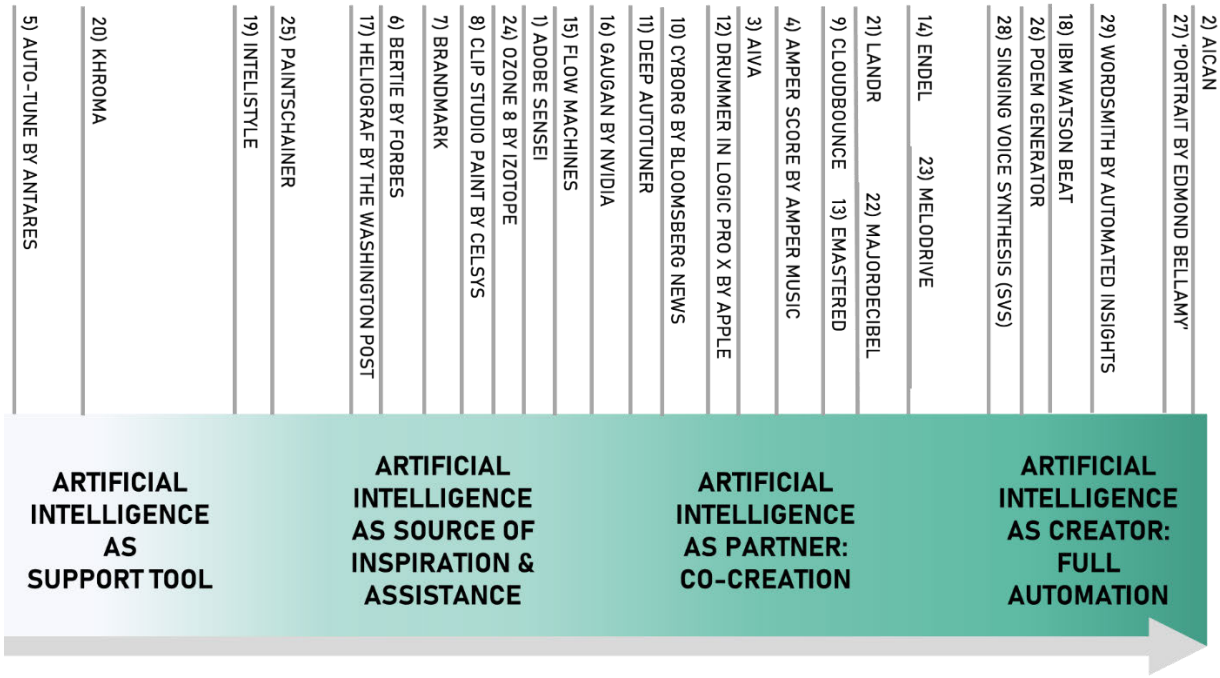
Appendix A (visually adapted, based on Meusburger, 2009; Unsworth, 2001; Unsworth & Luksyte, 2015)

Appendix B Stages of the Creative Process – A Comparison



*Appendix B (*own visualisation based on Boden, 2004; Dudek, 2011; Rhodes, 1961; Sawyer, 2013; Stein, 1974; Wallas, 1926)

Appendix C Examples of the Four Stages of Artificial Intelligence from the Creative Industry



1) **Adobe Sensei** ("Adobe Sensei", 2019)

→ AI integrated into various Adobe Clouds (using machine learning/deep learning)

- creative functions: "intuitive search features" (Lee, 2019); automated editing, subject recognition and modification tools for images, illustrations, animations and videos; audio type recognition and audio editing; visual font recognition; automated content fill for pictures and videos (removing unwanted subjects and replacing with matched replacement/subjects from stock photos)
- "powering creativity" ("Adobe Sensei", 2019)
    → "Adobe Sensei manages the tedious. So you can craft the creative." ("Adobe Sensei", 2019)
- focus not on creative product but on facilitation of creator's process through intelligent tools
- speeds up workflow (Lee, 2019)

2) **AICAN** ("AICAN", n.d.)

→ AI artist

- little to no human control of output; "a nearly autonomous artist" (Elgammal, 2019)
- based on algorithm 'creative adversarial network' (Elgammal, 2019)
- learns from existing work but is programmed to create nothing that resembles known work to closely; programmed not to create something that is completely unseen (Elgammal, 2019)
- can also name own works and judge its own creativity with regard to each work created (Elgammal, 2019)
- majority of people mistake it for human-made art
    - credit exclusively attributed to the system, not the programming artists, according to said artist (no control over the actually generated output)

3) **AIVA** ("AIVA - The AI composing emotional soundtrack music", 2018)
→ composition tool for soundtracks using artificial intelligence
- user can select style etc. and ultimately finalises the product

4) **Amper Score by Amper Music** ("AI Music Composition Tools for Content Creators", 2019)
→ platform for AI music composition
- "Our AI doesn't compose music for you, it composes with you." ("AI Music Composition Tools for Content Creators", 2019)
    → control lies with human creator
- "[facilitation of] creative process" (Deahl, 2018), "intelligence augmentation" (Deahl, 2018)
- input is music theory and hand-recorded musical instruments

5) **Auto-Tune by Antares** ("Home of Antares Audio - Auto-Tune and the Best Vocal Plug-Ins Available", 2019)
→ audio editing program
- involves (seemingly) not elements of artificial intelligence

6) **Bertie by Forbes** (Peiser, 2019)
→ AI tool for analysing data and drafting articles
- strongly assistive technology, requires human finalisation of product

7) **Brandmark** ("Brandmark - free logo and design tools", n.d.)
→ platform offering AI tools for logo design
- automated logo colouring, font choices, logo ranking against set measures and suggestions for logo enhancement ("Brandmark - free logo and design tools", n.d.)

8) **Clip Studio Paint by Celsys** ("CELSYS", n.d.)
→ graphics software for digital art
- includes AI tools for automated colouring of line art (CELSYS, 2019), "smart smoothing" of blurred/rigid lines (CELSYS, 2019), "pose scanner" to recognise people's poses on photos and recreate them in digital animations (CELSYS, 2019) etc.
- speeds up workflow (Lee, 2019)

9) **CloudBounce** ("CloudBounce - Instant audio mastering that works. Just hear it.", 2018)
→ platform for music mastering through machine learning, etc.

10) **Cyborg by Bloomsberg News** (Peiser, 2019)
→ AI tool for analysing data and generating a piece of journalism
- large benefit and competitive edge of such technology: time efficiency, speed of output

11) **Deep Autotuner** (Wagner et al., 2019)
→ assistant/co-creation
- pitch correction of recordings, further development towards the aim of real-time correction

12) **Drummer in Logic Pro X by Apple** ("Logic Pro X", 2019)
→ percussion automation using artificial intelligence
- user can select from a set of stylistic choices (e.g. genre) and regulators (e.g. volume, complexity)
- 'follow' function will allow the system to adapt to the musical input by the user

13) **eMastered** ("Online Audio Mastering by Grammy Winning Engineers | eMastered", 2019)
→ platform for music mastering using Artificial Intelligence

14) **Endel** ("Endel", 2019)
→ platform for creating sounds and sound sequences for the purpose of relaxation, focus and emotional wellbeing
- requires input of personal information for algorithm to tailor produced sounds to individual user

15) **Flow Machines** ("Flow Machines", 2018)
→ AI-assisted music composing system to facilitate augmented creativity
- generation of melody, chord and base
- no finalised song creation, only a source of inspiration to artists

16) **GauGAN by NVIDIA** ("Interactive Demos from NVIDIA Research", 2019)
→ image creation from sketches
- rough sketches ("segmentation maps" ("Interactive Demos from NVIDIA Research", 2019)) are transformed into photorealistic images
- filters available (change of colour scheme; change of image style, photo to painting, etc.)
- also: content removal and automated fill ("Interactive Demos from NVIDIA Research", 2019)

17) **Heliograf by the Washington Post** (Peiser, 2019)
→ AI tool for data analysis and generation of journalistic articles

18) **IBM Watson Beat** ("IBM Watson Beat", 2017)
→ experimental software for assistive music creation through the use of AI and machine learning
- user may specify basic characteristics such as mood, etc.
- based on musical theory
- in case study system was able to generate 80-90% of final output ("IBM Watson Beat", 2017)

19) **Intelistyle** ("A.I. Styling Solutions - Intelistyle", 2019)
→ fashion stylist tool using artificial intelligence and deep learning for outfit arrangement
- styling advice based on personal information
- outfit assembly from online shops
- matching items of clothing to other items already owned to create combinations

20) **Khroma** ("Khroma - The AI color tool for designers", 2019)
→ generation of colour combination based on user preference using neural network

21) **Landr** ("LANDR: Creative Tools for Musicians", 2019)
→ platform for music creation and distribution that offers an AI- and machine learning-powered mastering tool (mastering = last step in audio post-production)
- analyses the uploaded song/track to identify style and genre, identification of "audio post-production processors" ("LANDR: Creative Tools for Musicians", 2019), and adjustment of these for ultimate product enhancement

22) **MajorDecibel** ("MajorDecibel | Instant Online Audio Mastering Service", n.d.)
→ platform for automated music mastering
- user can only control output by selecting from a set of stylistic choices (e.g. intensity level low, medium or high)
[see above: Landr]
- "No instant online mastering service can claim to replace the work of a skilled mastering engineer." ("MajorDecibel | Instant Online Audio Mastering Service", n.d.)
→ most useful for 'amateur' artists, demo tracks, first experience with mastering and its potential

23) **Melodrive** ("Melodrive | Adaptive AI solutions", 2019)
→ AI music system for music composition through Artificial Intelligence
- also: capable of real-time adaptation to video games and VR
- customisation by user possible, choice of stylistic variables, e.g. changes to style, emotion, melody, instruments, etc.

24) **Ozone 8 by Izotope** ("iZotope Ozone 8 | The Future of Audio Mastering", 2019)
→ platform for music mastering employing AI elements
- automated track referencing through AI; generation of suggestions for track improvement (changes must be made by user)
[compared to Landr and others, more control by user over degree of change implementation]
→ "assistive technology" (Deahl, 2019)

25) **PaintsChainer** ("PaintsChainer -線画自動着色サービス-", n.d.)
→ automated colouring of line art and sketch simplification

26) **Poem Generator** ("Poem Generator", n.d.)
- user chooses type of poem and keywords

27) **"Portrait of Edmond Belamy"** (Elgammal, 2019)
- auctioned at Christie's for $432,500
- based on machine learning and data input of previous human-created portraits
→ full automation

28) **Singing Voice Synthesis (SVS)** (Rodet, 2002)
→ as almost full automation (system singing part of Mozart's opera 'The Magic Flute')

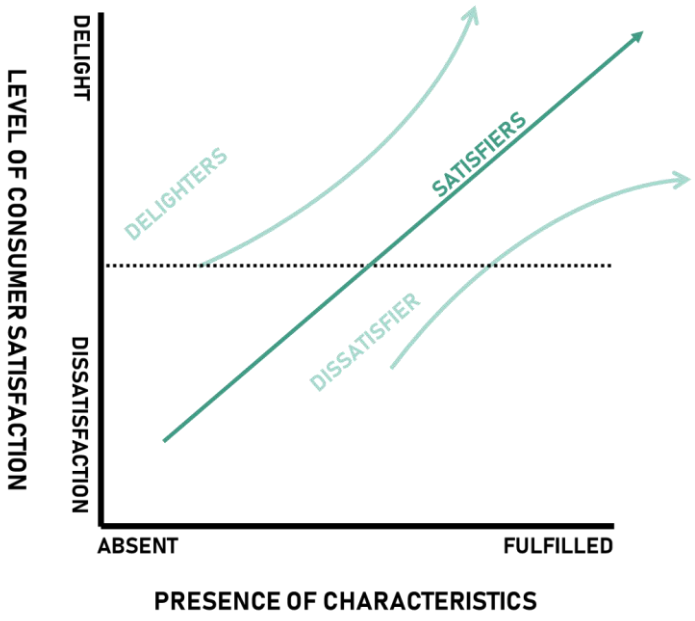
29) **Wordsmith by Automated Insights** ("NLG for Business Intelligence", 2019)
→ self-service natural language platform for article/report generation
- data is analysed and summarised in human-like text form

Appendix D Holbrook's Typology of Consumer Value

		EXTRINSIC	INTRINSIC
SELF-ORIENTED			
	ACTIVE	EFFICIENCY E.G.: OUTPUT VS INPUT	PLAY E.G.: FUN
	REACTIVE	EXCELLENCE E.G.: QUALITY	AESTHETICS E.G.: BEAUTY
OTHER-ORIENTED			
	ACTIVE	STATUS E.G.: IMPRESSION	ETHICS E.G.: MORALITY
	REACTIVE	ESTEEM E.G.: REPUTATION	SPIRITUALITY E.G.: FAITH

Appendix D (visually adapted, based on Holbrook, 1999)

Appendix E Kano's Model of Consumer Perception



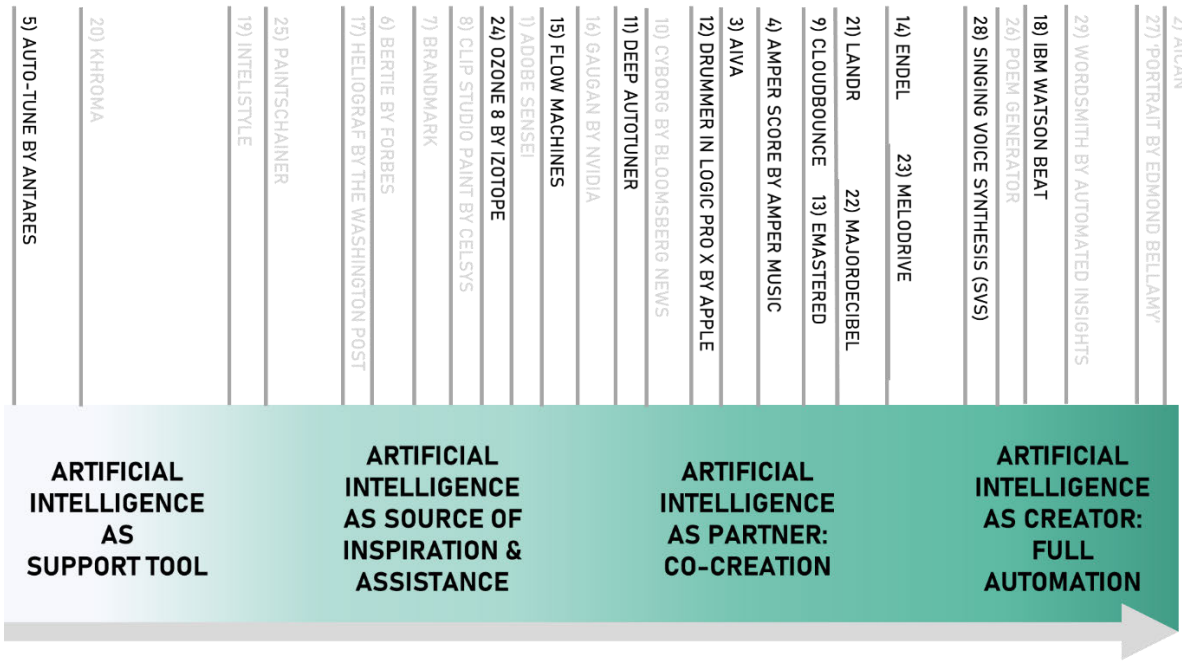
DISSATISFIERS:
- EXPECTED PRODUCT FEATURES
- PRESENCE RESULTS IN NEUTRAL CONSUMER PERCEPTION BUT ABSENCE LEADS TO DISSATISFACTION

SATISFIERS:
- EXPECTED AND REQUESTED PRODUCT FEATURES
- ABSENCE DISSATISFIES, PRESENCE SATISFIES

DELIGHTERS:
- INNOVATIVE PRODUCT FEATURES
- ABSENCE DOES NOT MINDER SATISFACTION, PRESENCE POSITIVLY SURPRISES CONSUMER

Appendix E (adapted from Khalifa, 2004, p. 648)

Appendix F Examples of the Four Stages of Artificial Intelligence from the Music Industry



Appendix G Questionnaire for Primary Data Collection

MUSICstats.org

Marketing Experiment

1. Welcome!

14%

Dear Participant,

We welcome you to this survey on consumers' perception of creative products and thank you for taking the time to participate in our study.

By participating in this study, you are giving your consent for the information gathered to be used in the respective research project. The information will be recorded and stored anonymously and securely. When the information is used in any publication produced during or in relation to this research project, no individual involved in the project as participant to this study will be identified.

Should any questions arise while you complete the following survey, please do not hesitate to ask the supervising researchers present.

MusicStats.org Team

*** 1. Please select the colour of the information sheet as displayed at your station**

MUSICstats.org

Marketing Experiment

3. QUESTIONS FOR TASK 1

43%

INSTRUCTIONS for TASK 1:

This stage of the experiment includes an excerpt of a pop song.
Before listening to the audio, please carefully read the provided background information on the composition process of this song.

2. On a scale of 1 to 5 (1 being 'Not at all familiar' and 5 being 'Extremely familiar'), please indicate how familiar you are with the presented song.

3. On a scale of 1 to 5 (1 being 'Did not like it at all' and 5 being 'Liked it very much'), please indicate how much you liked the presented song.

4. Please indicate to which extent you agree with the following statements, regarding the song excerpt presented to you. When evaluating the song for the following statements, please consider not just the song itself but also its composition process as indicated in the information provided.

	Fully disagree	Disagree	Neither agree nor disagree	Agree	Fully agree
This song has consistent quality.	○	○	○	○	○
This song is well made.	○	○	○	○	○
This song has an acceptable standard of quality.	○	○	○	○	○
This song makes me feel good.	○	○	○	○	○
This song gives me pleasure.	○	○	○	○	○
This song gives me a sense of joy.	○	○	○	○	○
This song makes me feel delighted.	○	○	○	○	○
This song gives me happiness.	○	○	○	○	○
This song would help me feel acceptable.	○	○	○	○	○
This song would improve the way I am perceived.	○	○	○	○	○
This song would make a good impression on other people.	○	○	○	○	○
This song would give its consumer social approval.	○	○	○	○	○

5. Regarding the SONG ITSELF, please evaluate the novelty of the product you were presented with, based on the following adjectives.

	Fully Disagree	Disagree	Neither agree nor disagree	Agree	Fully Agree
This song is **"new"**	○	○	○	○	○
This song is **original**	○	○	○	○	○
This song is **unusual**	○	○	○	○	○
This song is **novel**	○	○	○	○	○
This song is **atypical**	○	○	○	○	○

6. Regarding the song's COMPOSITION PROCESS, please evaluate the novelty of the creative process involved, based on the following adjectives.
Thereby please consider the information provided at your station.

	Fully disagree	Disagree	Neither agree nor disagree	Agree	Fully Agree
The composition process is **"new"**	○	○	○	○	○
The composition process is **original**	○	○	○	○	○
The composition process is **unusual**	○	○	○	○	○
The composition process is **novel**	○	○	○	○	○
The composition process is **atypical**	○	○	○	○	○

Considering the song's composition process, as outlined in the provided information, please indicate to which extent you agree with the following statements on your perception of the level of expertise.

7. The artist(s) involved in the composition of this song has/have a GREAT AMOUNT OF EXPERIENCE.

8. The artist(s) involved in the composition of this song is/are SKILLED in what they do.

9. The artist(s) involved in the composition of this song has/have GREAT EXPERTISE.

10. The artist(s) involved in the composition of this song does/do not have MUCH EXPERIENCE.

MUSICstats.org

Marketing Experiment

5. QUESTIONS FOR TASK 2

71%

INSTRUCTIONS for TASK 2:

This stage of the experiment includes an excerpt of a soundtrack taken from an advertisement.
Before listening to the audio, please carefully read the provided background information on the composition process of this song.

11. On a scale of 1 to 5 (1 being 'Not at all familiar' and 5 being 'Extremely familiar'), please indicate how familiar you are with the presented song.

12. On a scale of 1 to 5 (1 being 'Did not like it at all' and 5 being 'Liked it very much'), please indicate how much you liked the presented song.

13. Please indicate to which extent you agree with the following statements, regarding the soundtrack excerpt presented to you. When evaluating the soundtrack for the following statements, please consider not just the soundtrack itself but also its composition process as indicated in the information provided.

	Fully disagree	Disagree	Neither agree nor disagree	Agree	Fully agree
This soundtrack has consistent quality.	○	○	○	○	○
This soundtrack is well made.	○	○	○	○	○
This soundtrack has an acceptable standard of quality.	○	○	○	○	○
This soundtrack makes me feel good.	○	○	○	○	○
This soundtrack gives me pleasure.	○	○	○	○	○
This soundtrack gives me a sense of joy.	○	○	○	○	○
This soundtrack makes me feel delighted.	○	○	○	○	○
This soundtrack gives me happiness.	○	○	○	○	○
This soundtrack would help me feel acceptable.	○	○	○	○	○
This soundtrack would improve the way I am perceived.	○	○	○	○	○
This soundtrack would make a good impression on other people.	○	○	○	○	○
This soundtrack would give its consumer social approval.	○	○	○	○	○

14. Regarding the SOUNDTRACK ITSELF, please evaluate the novelty of the product you were presented with, based on the following adjectives.

	Fully Disagree	Disagree	Neither agree nor disagree	Agree	Fully Agree
This soundtrack is **"new"**	○	○	○	○	○
This soundtrack is **original**	○	○	○	○	○
This soundtrack is **unusual**	○	○	○	○	○
This soundtrack is **novel**	○	○	○	○	○
This soundtrack is **atypical**	○	○	○	○	○

15. Regarding the soundtrack's COMPOSITION PROCESS, please evaluate the novelty of the creative process involved, based on the following adjectives.
Thereby please consider the information provided at your station

	Fully disagree	Disagree	Neither agree nor disagree	Agree	Fully Agree
The composition process is **"new"**	○	○	○	○	○
The composition process is **original**	○	○	○	○	○
The composition process is **unusual**	○	○	○	○	○
The composition process is **novel**	○	○	○	○	○
The composition process is **atypical**	○	○	○	○	○

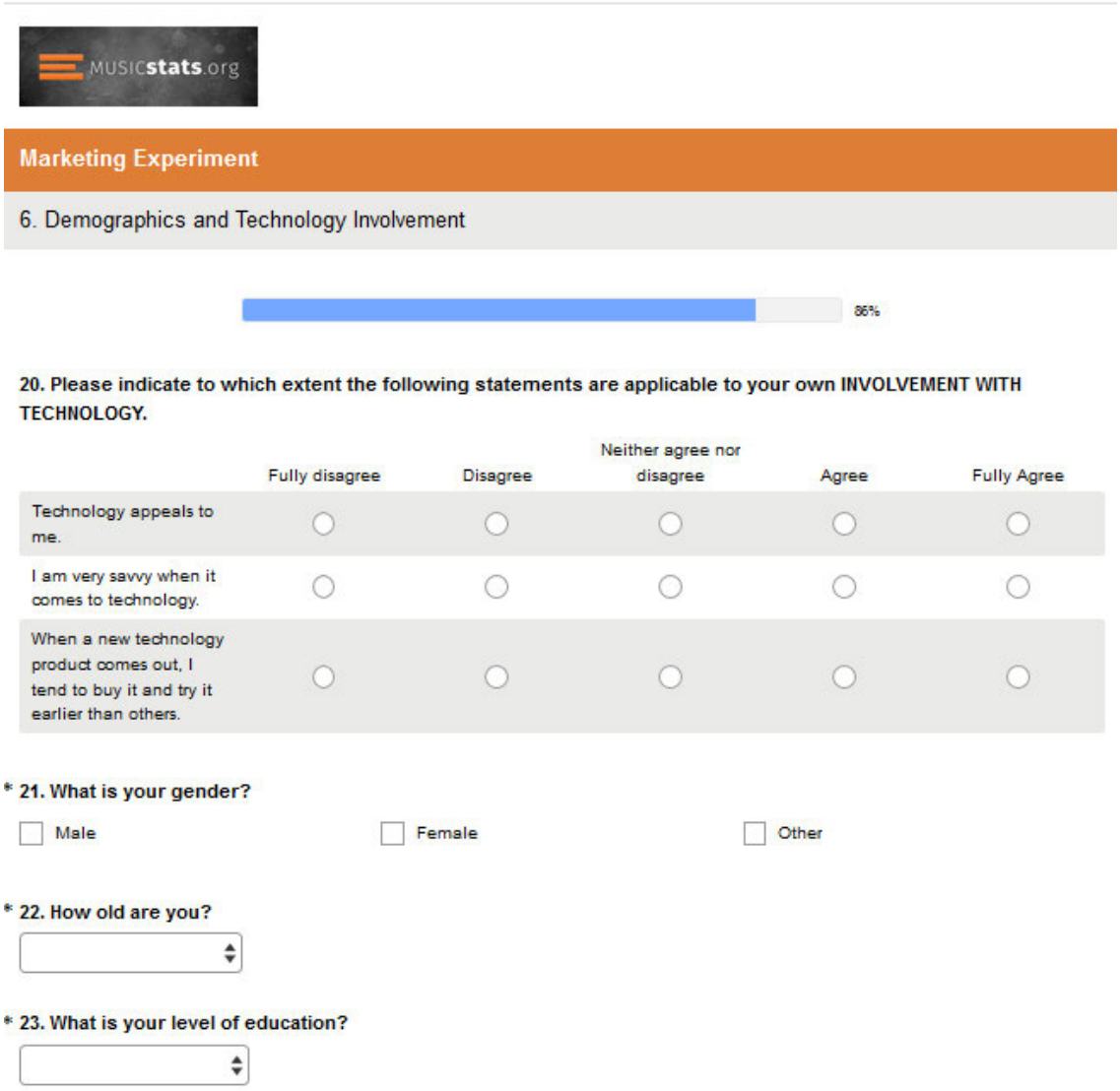
Considering the soundtrack's composition process, as outlined in the provided information, please indicate to which extent you agree with the following statements on your perception of the level of expertise.

16. The artist(s) involved in the composition of this soundtrack has/have a GREAT AMOUNT OF EXPERIENCE.

17. The artist(s) involved in the composition of this soundtrack is/are SKILLED in what they do.

18. The artist(s) involved in the composition of this soundtrack has/have GREAT EXPERTISE.

19. The artist(s) involved in the composition of this soundtrack does/do not have MUCH EXPERIENCE.



Appendix H Narratives used in Experimental Conditions (Q1)

N1: The excerpt you are about to hear is taken from a song **composed by an American artist, who is responsible for the melodic and harmonic composition, as well as the handwritten lyrics.**

Since this artist was in control of the entire composition, she was able to create a song reflecting her pure emotions, during that stage in her life. This song represents the heart of this artist's upcoming album. From Nashville, Tennessee the artist has returned to her childhood home to process all the life changes, which came from the decision to become an independent artist and step down from the commitment to a bigger music label. The artist felt enchained and struggled to further portray the image dictated by the label. By

going back to her roots, the artist was able to process her feelings and tap into deep and raw emotions.

This song acts as an anthem for this new chapter in her life about finally breaking free from the constraints of the label. The song portrays a simple and honest conversation about a broken soul and its rebirth.

N2: The excerpt you are about to hear is taken from a song **composed through a collaboration of Artificial Intelligence and an American artist**.

To help develop the mood and topic for a new hit, the artist of this song used AI technology to analyze successful songs and research sentiments of society. The data driven system was able to analyze top songs from the last 5 years as well as scan social media channels to discover current trending topics. The Artificial Intelligence reported a high trend towards the topic of "breaking free" as well as fitting genre, beats per minute and melodic suggestions for it. The co-creation process is characterized by the machine providing the melodic composition and strong suggestions for the lyrics, and the artist adding the harmonic composition as well as a human element to the provided lyric suggestions.

The following song represents an anthem celebrating a new chapter in her life, after the own experience of breaking free and taking back control from a constrained relationship with her previous music label. The song is a marriage between a human and a machine.

N3: The excerpt you are about to here is taken from a song **entirely composed by Artificial Intelligence**.

To create this pop song the system analysed all top 100 songs from the U.S. charts from the previous five years to detect popular song characteristics and themes. Additionally, the A.I.-tool scanned social media outlets for information on current concerns – 'taking the temperature' of the social climate and people's emotional expressions. The system generated the song's melody, harmonies, instrumentalisation as well as the lyrics – adhering, as programmed, to musical theory. Through continuous self-assessment the

system was able to continuously improve its own outputs and choose that which it deemed most suitable.

The result is a fully automated song that describes the chance of starting over in life and leaving behind any current constraints. It addresses a generation's determined, yet dauting pursuit of breaking free and taking back control of life.

(Only minor adjustments were made by humans prior to the release. The A.I.-written lyrics were sung and recorded by an American artist.)

Appendix I Narratives used in Experimental Conditions (Q2)

N1: The excerpt you are about to hear is taken from an advertisement. It includes a soundtrack **composed by a German artist**.

The artist – a singer-songwriter, was approached by representatives of a specific company, presented with a prototype of this ad and commissioned to compose its musical element. When watching the ad, its main character strongly reminded the artist of her own son. Subsequently, she was inspired to musically capture children's seemingly innate fascination with the world as well as their fearless urge to explore it.

The created song thereby conveys a sense of peacefulness and safety. In its lyrics it mirrors some deep-rooted yearning or longing, not just applicable to children but very much also to adults – an inner drive often hard to comprehend/fathom/grasp for anyone but that individual.

N2: The excerpt you are about to hear is taken from an advertisement. It includes a soundtrack **composed through a collaboration of Artificial Intelligence and a human artist**.

After being commissioned to compose the ad's musical element, the artist turned to an Artificial Intelligence tool as a partner in the creative process.

Looking to create a calm but emotional song, the artist determined the desired genre of the composition and instruments to be used. Based on this input, the system scanned previously popular songs of similar styles and analysed them for specific musical properties. It then generated a melodic draft as well as suggestions for suitable instrumentalisation. The subsequent process involved

further refinement of the song from both parties, with the artist later adding complimentary harmonies to the composition.

Their **collaborative effort** resulted in a delicate and peaceful song, communicating a strong emotional yearning or longing to the listener.

N3: The excerpt you are about to hear is taken from an advertisement. It includes a soundtrack **entirely composed by Artificial Intelligence**.

As a first step, the system behind this musical creation analysed the presented ad for visual keys and translated these into key words. It then matched these findings with previously released songs and music videos, filtering for those communicating similar sentiments in their lyrics or using similar visual cues. Based on an analysis of their musical properties, it was able to create compositional drafts for the required soundtrack. Through self-assessment the A.I.-system further refined its outputs until reaching the final version of the soundtrack. The lyrics were also generated through autonomously, a process also fed by the previous data analysis.

The result is a fully automated song that communicates an emotional yearning or longing for something to the listener, while conveying a sense of calm and peacefulness.

(Only minor adjustments were made to the composition by humans prior to the release of this advertisement. The A.I.-written lyrics were sung and recorded by a German artist.)

Appendix J Detailed Statistical Sample Group Structure

		Experimental Condition			Total
		Narrative 1	Narrative 2	Narrative 3	
Gender	Male	22	19	21	62
	Female	10	13	13	36
	Other	0	0	0	0
Age Group	Younger than 18	2	1	0	3
	18-25	26	28	25	79
	26-34	4	3	7	14
	35-43	0	0	1	1
	44-52	0	0	1	1
	53-61	0	0	0	0

	Older than 61	0	0	0	0
Level of Education	Lower than high school	0	0	0	0
	High school	7	13	6	26
	Bachelor's Degree	18	15	20	53
	Grad (e.g. Master's)	7	4	8	19
	PhD	0	0	0	0
Number of Participants		32	32	34	98

Appendix K Analysis of Variance – Independent Variable and Covariates

		Q1	Q2
Familiarity	Mean	N1: 1.7813 N2: 1.9063 N3: 2.2353	N1: 1.7816 N2: 2.0000 N3: 2.4412
	ANOVA	p = .230	p = .078
	df between groups	2	2
	df within groups	95	95
	F	1.492	2.621
Liking	Mean	N1: 3.2500 N2: 3.3750 N3: 3.2059	N1: 3.9063 N2: 3.4839 N3: 3.8235
	ANOVA	p = .843	p = .210
	df between groups	2	2
	df within groups	95	94
	F	.172	1.588

Appendix L1 ANCOVA – Results of Analysis for Dependent Variable: Quality

Q1		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.8125	3.810
	N2	32	3.8906	3.872
	N2	34	3.9167	3.936

Q1	df	F	Sig.
Familiarity	1	.343	.559
Liking	1	10.653	.002
Experimental Condition	2	.399	.672
Error	93		

Q2		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	4.0156	4.014
	N2	31	4.0323	4.081
	N2	34	4.1569	4.114

Q2	df	F	Sig.
Familiarity	1	2.979	.088
Liking	1	8.158	.005

Experimental Condition	2	.243	.785
Error	92		

Appendix L2 ANCOVA – Results of Analysis for Dependent Variable: Emotional Value

Q1		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.2719	3.295
	N2	32	3.4250	3.394
	N2	34	3.4368	3.444

Q1	df	F	Sig.
Familiarity	1	1.077	.302
Liking	1	34.263	.000
Experimental Condition	2	.378	.686
Error	93		

Q2		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.5438	3.484
	N2	31	3.2952	3.401
	N2	34	3.4765	3.436

Q2	df	F	Sig.
Familiarity	1	.118	.752
Liking	1	29.588	.000
Experimental Condition	2	.099	.905
Error	92		

Appendix L3 ANCOVA – Results of Analysis for Dependent Variable: Social Value

Q1		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.0573	3.073
	N2	32	3.0781	3.054
	N2	34	3.0123	3.020

Q1	df	F	Sig.
Familiarity	1	.388	.535
Liking	1	17.025	.000
Experimental Condition	2	.043	.958
Error	93		

Q2		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.4297	3.397
	N2	31	3.2661	3.354

	N2	34	3.4363	3.387

Q2	df	F	Sig.
Familiarity	1	.839	.362
Liking	1	13.922	.000
Experimental Condition	2	.021	.979
Error	93		

Appendix L4 ANCOVA – Results of Analysis for Dependent Variable: Product Novelty

Q1		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	2.8563	2.831
	N2	32	2.7219	2.692
	N2	34	2.8721	2.924

Q1	df	F	Sig.
Familiarity	1	6.204	.015
Liking	1	11.293	.001
Experimental Condition	2	1.125	.329
Error	93		

Q2		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.1109	3.092
	N2	31	2.7871	2.833
	N2	34	2.9059	2.882

Q2	df	F	Sig.
Familiarity	1	.211	.647
Liking	1	5.345	.023
Experimental Condition	2	1.117	.332
Error	92		

Appendix L5 ANCOVA – Results of Analysis for Dependent Variable: Process Novelty

Q1		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	2.7656	2.739
	N2	32	3.3500	3.324
	N2	34	3.3647	3.414

Q1	df	F	Sig.
Familiarity	1	4.784	.031
Liking	1	5.697	.019
Experimental Condition	2	8.398	.000
Error	93		

Q2	N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)	
Experimental Condition	N1	32	3.0125	2.978
	N2	31	3.1774	3.236
	N2	34	3.5941	3.573

Q2	df	F	Sig.
Familiarity	1	.016	.901
Liking	1	8.264	.005
Experimental Condition	2	4.932	.009
Error	92		

Appendix L6 ANCOVA – Results of Analysis for Dependent Variable: Expertise

Q1		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.5000	3.490
	N2	32	3.5000	3.482
	N2	34	3.3725	3.399

Q1	df	F	Sig.
Familiarity	1	1.305	.256
Liking	1	5.677	.019
Experimental Condition	2	.229	.795
Error	93		

Q2		N	Mean	Adjusted Mean (Effect of Covariates Statistically Removed)
Experimental Condition	N1	32	3.7292	3.735
	N2	31	3.6344	3.676
	N2	34	3.8137	3.771

Q2	df	F	Sig.
Familiarity	1	3.959	.050
Liking	1	6.528	.012
Experimental Condition	2	.248	.781
Error	92		

ix. Declaration of Authenticity

Declaration of Authenticity

Herewith I confirm that this thesis is my own work, which was written without unauthorized assistance and that all references used are marked appropriately.

Place, Date	**Signature** (original – no scans please!)