

Artificial Creativity and Music: Exploring How Different Levels of Automation During Composition Process Impact Listeners' Value Perception.

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Abstract:

This paper investigates which effect the integration of artificial intelligence into the creative process may have on consumers' product perception. A between-design experiment was conducted with 98 participants, who were presented different descriptions regarding the creative process of music they heard: as if it was the work of a human creator, the result of human-AI co-creation or of full automation. The narratives were applied to a high-involvement context (music listening for pleasure) and a low-involvement context (music as background for a commercial). Results indicated that the integration of artificial intelligence into the creative process, if communicated to the consumer, increases consumers' perceived process novelty. No statistically significant effect was found for the other dependent variables measured.

Keywords: Artificial Creativity, Value Perception, Music

Track: Innovation Management & New Product Development

1. Introduction

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 (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.

2. Theoretical Foundation

2.1 Artificial Intelligence and Artificial Creativity

Creativity, as an element of artistic expression, is by many considered profoundly and exclusively human (Meusburgern 2009; Rhodes, 1961). And while technology is widely accepted as effective in supporting individuals in their creative aspirations (Pachet, 2006), 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 (AI). Focussing on its ability to think and act humanly (Russell & Norwig, 2010), Artificial Intelligence is defined as “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).

Artificial Creativity thereby refers to a system's capability of “achieving or simulating behaviour which in humans would be deemed creative” (Wiggins & Forth, 2018, p. 3). Merging numerous perspectives on the topic as extracted from the relevant literature, the possible involvement Artificial Intelligence in the creative process can be summarized into three stages, shown in Figure 1 and developed for the purpose of this research.

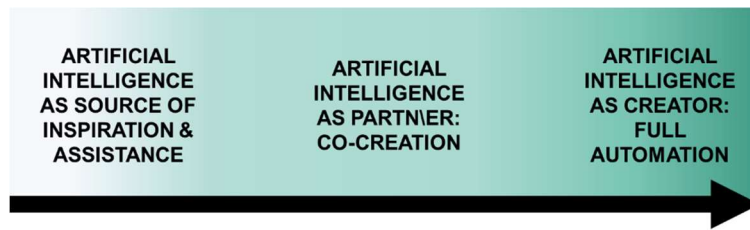


Figure 1: Degree of Involvement of Artificial Intelligence in Creative Processes (visualisation developed for the purpose of this research project; based on Jordanous, 2017; Lubart, 2005; Negrete-Yankelevich & Morales-Zaragoza, 2014; PricewaterhouseCoopers International, 2017)

Stage 1: AI as Source of Inspiration and Assistance

At this stage the direct, yet passive role of Artificial Intelligence (Gobet & Sala, 2019) in the creative process may be two-fold. As an assistant to a human creator, AI is considered effective in reducing the workload by automating routine tasks (Pfeiffer Consulting, 2018), 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. 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).

Stage 2: AI as a Creative Partner – The Concept of Co-Creation

The second stage sees Artificial Intelligence exert an active influence on the generation of creative products (Gobet & Sala, 2019; Lubart, 2005), and by reducing the role of the human creator, this results in a shift from a human-dominated to a human-involved process (Negrete-Yankelevich & Morales-Zaragoza, 2014). 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). 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 & Toivanen, 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 & Toivanen, 2014).

Stage 3: AI as Autonomous Creator

The full automation of creative processes is able to eliminate the need for human involvement (Gobet & Sala, 2019; Kantosallo, Toivanen & Toivonen, 2015) or reduce it to purely managerial and administrative tasks (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).

Aside from the generally positive tenor of an anticipated rise in productivity, ergo economic performance (McKinsey Global Institute, 2018; Weber Shandwick, 2016), the integration of AI into the creative industry has sparked concern over the devaluation of creative products, 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).

2.3 Consumer Value

Value – or the cognitive-affective process of evaluation (Sánchez-Fernández & Iniesta-Bonillo, 2007) is a highly complex multi-dimensional concept, with regard to both its definition as well as its measurement (Parasuraman, 1997; Zeithaml, 1988). 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; Sheth, Newman & Gross, 1991; Smith & Colgate, 2007; Sweeney & Soutar, 2001).

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 paper, 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; Zeithaml, 1988) and context dependent (Parasuraman, 1997). With the perceived value, or the value as determined by the consumer, potentially differing strongly from that intended by the producer or the real value of

an object, 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 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 a positive rather than a negative impact on creative products and process remains unclear.

3. Methodology

Given the theoretical foundation presented, this research investigated the causal relationship between different levels of automation in the composition process and their effect on the value perception of a song (high involvement) and a commercial soundtrack (low involvement) from a consumer’s perspective. Thus, a 3x2 between group design experiment was conducted. The main experimental manipulation referred to the narrative told to participants in regards to the composition process of the song they heard: Level 1 – Song/Soundtrack composed entirely by a human; Level 2 – Song/Soundtrack co-created by a human and an AI; and Level 3 – Song/Soundtrack composed mostly by an AI.

During the experimental task, for the *high-involvement* piece of music, participants listened to an excerpt of *Genesis*, from the singer/songwriter Taryn Southern’s album *I AM AI*, which includes songs co-created with Artificial Intelligence (Southern, 2018). The *low-involvement* piece of classical music *The Journey* was composed and performed by Philipp Feit, Roman Rossbach and Mia Spengler, and presented to the participants as background music to the advertisement *The Journey* (0:00-1:23 min.), by *Mercedes Benz* (Bruns, 2012).

Following the respective task, participants answered a self-completion questionnaire measuring constructs such as Qualitative Value (Sweeney & Soutar, 2001), Emotional Value (Petrick, 2002), Social Value (Sweeney & Soutar, 2001), Novelty of Product and Process (Bruner, 2009, p. 658) and Level of Expertise (Bruner, 2009, p. 370). All scales were measured through 5-point Likert-type anchors.

To ensure a higher degree of explanation towards the causal relationship being analyzed, covariates, such as *liking*, *familiarity* and *technological involvement*, were included in the questionnaire. The first two on a single-item 5-point Likert scale (Gill & Johnson, 2002; Fields, 2015) and the last on a three item 5-point Likert scale (Bruner, 2012, p. 394). Finally, the experiment was conducted in September 2019 and the total sample of 98 participants was comprised mostly of university students.

4. Results

In total the study included 98 participants, mostly male (63,7%), between the ages of 18 and 25 (80,6%) holding a bachelor's degree (54,1%). The distribution of participants within the three narratives was fairly even, with at least 30% of the respondents having taken part in each.

First, a Cronbach Alpha reliability test was applied to test for all multi-item scales. Overall, all scales achieved satisfactory results of reliability. Following this, an ANOVA was applied to test the independence of the *covariates* from the independent variable, the *narrative*. As shown in Table 1, results indicated the covariates were proven to be independent and an ANCOVA could thus be performed (Field, 2015).

Covariate	Song				Soundtrack			
	Human Mean / SD	AI Co-creation Mean / SD	Automation Mean / SD	ANOVA	Human Mean / SD	AI Co-creation Mean / SD	Automation Mean / SD	ANOVA
Familiarity	3,81/ 0,67	3,97/ 0,72	3,92/ 0,57	p = ,230	4,02/ 0,63	4,03/ 0,55	4,16/ 0,61	p = ,078
Liking	3,27/ 0,86	3,43/ 0,80	3,44/ 0,83	p = ,843	3,54/ 0,90	3,29/ 0,68	3,48/ 0,86	p = ,210

Table 1. Descriptive Statistics and ANOVA for Covariates

Tables 2 and 3 show the descriptive statistics of the dependent variables, as well as the two statistical significances extracted from the calculated ANCOVA. The data shows that for both pieces of music, the level of automation has a significant influence on the perception of novelty for the composition process. With only two dependent variables being detected with a statistical significance and the means across all narratives being relatively close, it can be concluded that the communication of a higher automation level used during the composition process of music, shows little effect on consumers' perception.

Dependent Variable	Song			Soundtrack		
	Human Mean / SD	AI Co-creation Mean / SD	Automation Mean / SD	Human Mean / SD	AI Co-creation Mean / SD	Automation Mean / SD
Qualitative Value	3,81/ 0,67	3,97/ 0,72	3,92/ 0,57	4,02/ 0,63	4,03/ 0,55	4,16/ 0,61
Emotional Value	3,27/ 0,86	3,43/ 0,80	3,44/ 0,83	3,54/ 0,90	3,29/ 0,68	3,48/ 0,86
Social Value	3,06/ 0,73	3,08/ 0,83	3,01/ 0,85	3,43/ 1,05	3,33/ 0,79	3,44/ 0,91
Product Novelty	2,88/ 0,72	2,72/ 0,70	2,73/ 0,83	3,11/ 0,78	2,83/ 0,69	2,91/ 0,74
Novelty Process	2,71/ 0,63	3,35/ 0,75	3,36/ 0,85	3,01/ 0,80	3,23/ 0,91	3,59/ 0,67
Level of Expertise	3,50/ 0,56	3,41/ 0,65	3,37/ 0,69	3,78/ 0,49	3,70/ 0,65	3,81/ 0,66

Table 2. Descriptive Statistics for Dependent Variables.

Piece of Music	Values of Perception	Mean N1	Mean N2	Mean N3	df	F	Sig.	Cronbach's Alpha, N1/N2/N3	Pearson Correl.
Song	Process Novelty	2,71	3,35	3,36	2	9,31	0,00	,77/,79/,82	-
Soundtrack	Process Novelty	3,01	3,18	3,59	2	4,93	0,01	,87/,88/,77	-

Note: ANCOVA = Analysis of Covariance; N1 = Human, N2 = Co-Creation; N3 = Fully Automation

Table 3: Means, ANCOVA & Reliability of Statistically Significant Dependent Variables.

Furthermore, paired T-tests were used to explore the significant differences between the *high-involvement* and *low-involvement* pieces of music. Table 4 contains all significant cases detected. Since all means across these cases are higher for the soundtrack, it shows that for low-involvement products the overall perception and sentiment is more positive. Therefore, it can

be concluded that there is a statistically significant difference between consumers' perception of the high- versus the low involvement piece of music used in this study.

Dependent Variable	Narrative	Song Mean/ SD	Soundtrack Mean/ SD	t	df	Sig.
Social Value	Human	3,06 / 0,73	3,43 / 1,05	2,77	31	0,01
Social Value	Fully Automated	3,01 / 0,85	3,44 / 0,91	-2,57	33	0,02
Product Novelty	Human	2,86 / 0,55	3,11 / 0,78	2,25	31	0,03
Process Novelty	Human	2,77 / 0,57	3,01 / 0,80	-2,09	31	0,05
Process Novelty	Fully Automated	3,36 / 0,85	3,59 / 0,67	-2,39	33	0,02
Level of Expertise	Human	3,50 / 0,56	3,73 / 0,50	-2,98	31	0,01
Level of Expertise	Fully Automated	3,37 / 0,69	3,81 / 0,66	-3,73	33	0,00

Table 4: Statistically Significant Paired T-Test Results

5. Limitations and Implications

The study presented is part of a bigger research project and extended to creative contexts beyond music. Due to convenience sampling, the findings should not be generalized, as the sample, while relatively large, does not represent the entire population. A further possible limitation is the choice of advertisement shown for the low-involvement music and the song chosen for the high-involvement context.

As for managerial recommendations, the findings within this study urge companies marketing to technology savvy consumers, open to new production methods, to communicate clearly when AI is included in the production process. This may act as a leverage for an overall more positive perception of the presented product, service or experience. Respective countermeasures in marketing should be taken for target groups opposed to certain technological advancements. Overall it should be noted that this study 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.

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