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Artificial Intelligence in Musical Creativity: Opportunities, Ethical Challenges, and Prospects for the Art of Composition

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Abstract

Generative systems already create complete music tracks from a text prompt, and composers find themselves between new working tools and the threat of the devaluation of professional labour. Studies of the perception of such music give contradictory results. Ukrainian composers' experiences of these systems remain insufficiently examined. The article aims to substantiate a typology of artificial intelligence participation in compositional creativity and to develop an empirical design for examining composers' acceptance of these technologies, their assessment of ethical risks, and their ability to distinguish between human- and machine-generated music. The methodology combines a systematised review of relevant recent and foundational scholarship, conceptual modelling, and statistical power analysis for the proposed empirical design. Four levels of artificial intelligence participation are distinguished: tool, assistant, co-creator and autonomous generator. As system autonomy increases, the composer's role shifts from control over all artistic decisions to that of client, and ethical risk moves from the lack of transparency of use to systemic problems of training data, labour and stylistic diversity. A safeguard is proposed for each level. A questionnaire for professional composers and student composers and an eight-excerpt blind listening-test protocol have been developed. For a planned sample of 48 participants per group, the power analysis suggests sensitivity to a group difference of approximately 0.59 standard deviations or a correlation of approximately 0.29 at 80% power, under the specified assumptions. The survey and listening test have not yet been administered; therefore, no participant-level findings or hypothesis test results are presented. The model and instruments may inform music education, labelling practices, and agreements concerning creative contributions.

Keywords: artificial intelligence, compositional creativity, generative music, human–machine co-creativity, copyright, ethics of artificial intelligence, music perception.

1. INTRODUCTION

Methods of music generation have progressed from statistical models to pretrained language models and now encompass symbolic, audio, and multimodal music generation [1]. Users of the Suno and Udio platforms have already created collections of tracks suitable for comparison with human popular music; in such a comparison, Suno tracks occupied a narrower harmonic and formal space than the human-created tracks analysed [2]. In a blind test, listeners with musical training could not reliably determine who had created an excerpt, a human or a system [3]. For composers, the spread of such systems means a risk of devaluation of creative labour [4]. Since 2023, a special right to non-original objects generated by a computer program has been in force in Ukraine, so the boundary between a composer's work and a generated result has become legally significant [5].

The capabilities of artificial intelligence (AI) are described in the literature mainly in terms of technical tasks [6]; ethical challenges are considered separately from the share of creative decisions taken over by the system. There are no empirical data on how Ukrainian composers accept these technologies and whether they hear the difference between human and machine music. The aim of the article is to substantiate a typology of AI participation in compositional creativity and to develop a design for its empirical testing. The tasks are to systematise the capabilities and ethical challenges of AI by levels of participation, build a model of "level of participation – ethical challenge – safeguard", develop a questionnaire and listening test and substantiate the sample size.

The capabilities of generative systems grew faster than composers' control over them. According to Briot and Pachet [7], deep networks learn musical styles from training corpora but may imitate source patterns, resist explicit musical constraints, such as a specified key, and generate material without sustained interaction with a musician unless additional mechanisms are provided. Later reviews describe the transition from symbolic generation [8] to audio and multimodal systems, where interactive and co-creative generation appeared alongside autonomous generation [1]. According to the classification of Mycka and Mańdziuk [6], research on AI in music in 2017–2023 is concentrated on classification, generation and recommendation. There is still no common measure of generation quality: subjective and objective evaluation methods have their own limitations [9]. A corpus analysis of more than 60,000 tracks showed that Suno music tends more strongly than Udio and human music towards Western pop progressions such as I–V–vi–IV and simple repetitions of verse and chorus [2].

Whether AI complements the composer or replaces the composer depends on how the interaction is organised. Gioti [10] evaluated automatic composition systems using M. Boden's criteria of novelty, surprise and value and contrasted human–machine competition with distributed co-creativity, in which computational creativity expands the composer's space of possibilities rather than replacing the composer. Ben-Tal et al. [11] described their models as tools for co-creativity and tested the plausibility of the generated material through an album sent to expert reviewers. In Ukrainian works, this interaction is assessed differently. Krepak [12] considers the combination of AI with human sensibility a symbiosis that increases the artistic quality and efficiency of compositional labour and sees technological innovations as new channels for rethinking folklore. Shalamov [13] analyses generative systems in relation to the practice of composers, directors, producers and performers and stresses the risks of uncontrolled self-learning and the spread of misinformation.

Data on the perception of AI music are contradictory: the result depends on the genre, label and measure. In the experiments of Shank et al. [14], listeners more often attributed electronic music to AI and liked music less when they believed it had been created by a machine, but an explicit "AI" label lowered ratings only for classical excerpts that sounded "human". Songs labelled "AI" in the work of Chia et al. [15] received higher ratings for positive emotions. A survey of 446 people, including 72 professionals, found a rather negative attitude towards AI music, although in the experiment the explanation of its production did not affect ratings [16]. AI soundtracks caused greater pupil dilation and, according to self-reports, stronger arousal; human music seemed more familiar [17]. In a blind test with 71 participants with musical training, the association between the actual origin of an excerpt and its attribution was very weak (Cramér's $V = 0.095$), and even 54.7% of human excerpts were attributed incorrectly [3]. These works do not establish whether composers specifically distinguish the origin of music.

Musicians' attitudes towards AI combine recognition of its usefulness and concern, so these should be measured together. Interviews with 11 professional video game composers showed that they recognise its usefulness, but the "creative ego" conflicts with such systems, and a lack of knowledge, support and trust slows their use [18]. In the survey by Ma et al. [19], AI acceptance correlated with creative outcomes, especially among practitioners with formal music education and experience with composition software. Among 392 vocal music students and graduates in China, AI anxiety was closely associated with employment anxiety ($r = 0.678$), while the perception of the replacement of vocal performance added no explanatory power [20]. The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) extended the earlier model by incorporating hedonic motivation, price value, and habit. In its original validation, explanatory power for behavioural intention increased from 56% to 74% [21].

Researchers formulate the ethical challenges of generative music mainly at the level of the industry rather than the

individual work. A systematic review of 884 works on generative audio models showed that positive consequences are mentioned in 65% of works and negative ones in fewer than 10%, although risks of fraud, deepfakes and copyright infringement have already been described [22]. Morreale [4] sees two urgent problems: the growth of a "surplus population" of artists with the devaluation of creative labour and the neocolonial exploitation of existing music and listeners' preferences. According to Celis Bueno and Salvador-Mata [23], the benefits and harms of generative AI are distributed unequally, and they should be analysed, in particular, by the form of automation: replacement, augmentation, human-enhanced automation or control. Answers are sought in remuneration: an AI-royalty fund managed by a national collective management organisation is proposed [24], as are collective licensing, compulsory licences and levies on generated outputs, because the EU AI Act does not ensure fair remuneration for authors [25].

Ukraine has chosen a separate path: since 1 January 2023, generated objects have been covered by a sui generis right [26]. Even at the draft law stage, Maidanyk [27] considered these provisions premature because they were intended for fully autonomous AI; the author recognised investment theory as the only justification for such protection and warned that the provision might prove excessive. Shtefan [26] notes the distinction between generated objects and human works and the refusal to recognise the legal personality of AI, but criticises unclear eligibility criteria for protection, automatic protection without exceptions, the full set of exclusive rights and the long term of protection. According to Oprysk's assessment [5], Article 33 is worded so broadly that it covers even simple data, does not identify the rightsholder, and there is still almost no evidence of its impact on practice.

The literature review identifies three gaps. Existing typologies describe the tasks of music systems [6] or forms of automation of creative labour [23], but do not link the share of artistic decisions delegated to the system to specific ethical challenges for the composer. In the works reviewed, the perception of AI music was studied among listeners and students, rarely among professional composers and never in Ukraine. Technology acceptance and ethical concerns are mostly measured separately. The article addresses the first gap through a typology and model; for the other two, a prospective design jointly measures technology acceptance, ethical concerns, and the ability to distinguish musical origins within one sample.

The aim of the study is to determine how the distribution of creative decisions between the composer and AI changes the ethical challenges of compositional labour, and to prepare a test of these ideas among Ukrainian composers. This requires distinguishing levels of AI participation by the distribution of decisive artistic decisions between the human and the system and describing the composer's role, the dominant ethical challenge and a safeguard for each level. The empirical part is to measure AI acceptance, ethical concerns and the ability to distinguish the origin of music among professional composers and student composers, and to substantiate a sample size sufficient for medium-sized effects.

The hypotheses follow from the review. H1: professional composers have a higher ethical concerns index than student composers because their incomes and professional identity are more closely linked to authorship; the hypothesis will be supported if the median of the professional group is higher and the Mann–Whitney U test indicates $p < 0.05$. H2: participants distinguish AI-generated and human-created excerpts better than chance; the hypothesis will be supported if the full-sample median sensitivity d' exceeds zero under a one-sample Wilcoxon signed-rank test ($p < 0.05$). Listeners with musical training attributed excerpts almost randomly in a similar test [3], so H2 tests whether compositional experience gives an advantage. H3: more frequent AI use is associated with lower ethical concerns; the hypothesis will be supported if Spearman's ρ is negative and $p < 0.05$. Ratings of the originality of AI and human excerpts are compared exploratively, without a hypothesis.

2. MATERIALS AND METHODS

The theoretical component draws on recent scholarship published primarily between 2020 and 2026, supplemented by foundational methodological and technology-acceptance sources. Relevant works were identified using OpenAlex searches on music generation, music perception, technology acceptance, ethics, and copyright, with attention to research indexed by Scopus. Because complete search strings, search dates, and screening counts are not available, the procedure is described as a systematised review rather than a reproducible systematic review. Works on the creative process, ethics, and law were coded by three features (AI function, composer's role, ethical challenge), and the typology and model were compiled from these codes. The planned empirical component comprises an online questionnaire for professional composers and student composers and a blind listening test, as detailed in Table 2. Recruitment settings and channels, the AI generator and version, and the sources and permissions for human-created excerpts must be documented before the protocol is implemented. These design details are not treated as completed procedures in the present article.

The proposed analysis will assess scale reliability using Cronbach's α coefficient in Eq. (1), where k is the number of items, σ_i^2 is the item variance, and σ_X^2 is the variance of the summed scores. Between-group comparisons will employ the Mann–Whitney U test, with effect size r defined in Eq. (2); Z denotes the standardised U statistic, and N the total sample size. Recognition of musical origin will be measured using sensitivity d' using the log-linear correction [28] in Eq. (3), where h is the number of AI excerpts correctly identified, f is the number of human excerpts incorrectly identified as AI,

$n_A = n_H = 4$, and z denotes the standard normal quantile function.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k}\sigma_i^2}{\sigma_X^2}\right), \tag{1}$$

$$r = \frac{Z}{\sqrt{N}}, \tag{2}$$

$$d' = z\left(\frac{2h+1}{2n_A+2}\right) - z\left(\frac{2f+1}{2n_H+2}\right). \tag{3}$$

The analysis will compare the median d' with zero using a one-sample Wilcoxon test, the originality ratings of AI and human excerpts using a paired Wilcoxon test, and examine the association between frequency of use and concerns using Spearman's ρ coefficient. The planned sample size was examined through power analysis for $\alpha = 0.05$ and power of 0.80 with an adjustment for the asymptotic relative efficiency of nonparametric tests of $3/\pi$. The reported prospective calculations use Python (statsmodels and scipy).

3. RESULTS

3.1. TYPOLOGY OF AI PARTICIPATION IN THE COMPOSER'S WORK

The review made it possible to distinguish four levels of AI participation according to who makes the decisive artistic decision (Table 1). At the tool level, all artistic decisions are made by the composer, and the system only analyses, classifies and recommends material or performs technical operations. The assistant already proposes variants of melody, harmonisation and accompaniment, so the composer becomes the person who selects and edits. The co-creator conducts an iterative dialogue with the composer about form and structure; the concept, curation and combination of material remain with the human. An autonomous generator creates a complete track, leaving the human primarily as a prompt author or commissioning client. These levels refer to creative control, not legal authorship.

Table 1. *Typology of Artificial Intelligence Participation in Compositional Work*

Level of AI participation	What AI does	Composer's role	Main ethical challenges	Sources
Tool	classifies and analyses material, recommends, performs technical operations on command	makes all artistic decisions	invisibility of AI use in the final work	Mycka and Mańdziuk [6]
Assistant	proposes variants of melody, harmonisation and accompaniment within specified limits	selects and edits what is proposed	reproduction of the training corpus style, share of authorship	Briot and Pachet [7], Ji et al. [8]
Co-creator	participates in an iterative dialogue, proposes structural decisions	formulates the concept, curates and combines material	blurred boundary of authorship and eligibility for protection	Gioti [10], Ben-Tal et al. [11]
Autonomous generator	creates a complete track from a text prompt	prompt author or client	consent and remuneration of training data authors, devaluation of labour, possible narrowing of stylistic diversity	Morreale [4], Dalmazzo et al. [2]

Source: compiled by the author on the basis of the literature review

Ethical challenges change not only in intensity but also in nature. At the first two levels, they concern an individual work: whether AI use is visible in it and to what extent the proposed material reproduces the style of the training corpus. At the co-creator level, the boundary between the composer's work and the generated result becomes blurred, and the protection regime depends on it: in Ukrainian law, this is the boundary between copyright and the sui generis right to non-original generated objects. The challenges of the autonomous generator extend beyond the work. They concern the consent and remuneration of the authors on whose works the model was trained, the devaluation of compositional labour and the possible narrowing of stylistic diversity visible in collections of tracks.

3.2. THE "LEVEL OF PARTICIPATION – ETHICAL CHALLENGE – SAFEGUARD" MODEL

The conceptual model in Figure 1 assigns a dominant challenge and corresponding safeguard to each level. At the tool level, disclosure of AI use in credits and metadata is a proposed minimum safeguard, although additional obligations may apply depending on the nature of the source material. The assistant requires licensed training data and respect for rightsholders' opt-outs from the use of their works. Co-creativity requires documenting creative contribution and specifying shares in agreements. Autonomous generation requires labelling outputs, collective licensing and a mechanism for redistributing income to authors, such as an AI-royalty fund. The safeguards of lower levels remain in force at higher ones: disclosure of AI use is needed at both the co-creator and generator levels, so the model is cumulative.

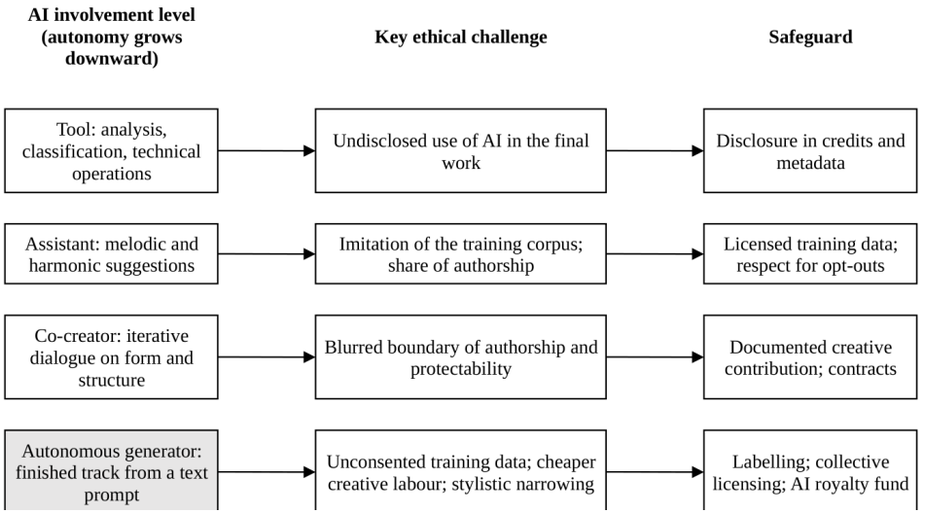


Figure 1. *Conceptual Model: Levels of AI Participation, Ethical Challenges, and Safeguards*
Source: compiled by the author on the basis of Gioti [10]; Celis Bueno and Salvador-Mata [23]; Quintais [25]; Jacques and Flynn [24]

Three testable implications follow from the model. If the most acute challenges are concentrated at the autonomous generator level, they should be of greater concern to those whose incomes depend on commissions, that is, professional composers (H1). Disclosure of AI use is the model's basic safeguard, and the need for it increases if even specialists do not recognise the origin of music by ear (H2). If experience encourages composers to regard AI as a usable resource rather than solely as a threat, frequency of use may be associated with lower concerns (H3). This is a hypothesis, not an observed association.

3.3. INSTRUMENTS AND SAMPLE SIZE

The proposed instrument comprises seven blocks: six questionnaire blocks and a listening test (Table 2). The scales of expected usefulness, expected effort and behavioural intention contain three items each, adapted from UTAUT2. The six items of the ethical concerns index correspond to the challenges of the model: authorship, consent of training data authors, labelling, income, stylistic diversity and the value of professional education. The proposed ethical concerns index will be calculated as the mean of its six items if internal consistency is acceptable (Cronbach's $\alpha \geq 0.70$). If not, item-level diagnostics and scale revision will be reported rather than treating the index as validated. The listening test is balanced: four AI and four human excerpts make it possible to calculate d' for each participant. The probability of correctly identifying the origin of at least seven of the eight excerpts by guessing is 3.5%, so a randomly high result for an individual participant is unlikely.

The proposed sample size is justified by the reported power analysis (Figure 2). A comparison of groups with a medium effect size of d = 0.5 requires 67 people in each group. For $d = 0.6$, 47 people per group are sufficient. A large effect of $d = 0.8$ is detected with as few as 27. Testing H2 with a small effect of $d_z = 0.3$ requires 94 participants. For H3 with $\rho = 0.3$, 89 are needed.

The proposed recruitment target is 96 participants, with 48 in each group. Under the stated assumptions, this sample size offers approximately 0.81 power for H1 at $d = 0.6$ and H2 at $d_z = 0.3$. For H3 at $\rho = 0.3$, power is approximately 0.83. The approximate minimum effect detectable with 0.80 power is $d = 0.59$ for H1. For H2 and H3, these thresholds are lower: 0.30 and 0.29.

Table 2. *Structure of the Questionnaire and Listening Test*

Block and response scale	Items
Participant profile	group (professional composer or student composer), age, years of compositional activity, main genre area
Frequency of AI use (AF), 1–5	"How often do you use AI tools in compositional work?" (1 – never … 5 – daily)
Expected usefulness (PE), 1–7	PE1 "AI tools speed up my work on a composition"; PE2 "…help me find new musical ideas"; PE3 "…improve the quality of the result"
Expected effort (EE), 1–7	EE1 "Learning to work with AI tools is easy"; EE2 "Interaction with them is clear to me"; EE3 "It is easy for me to achieve the required result with them"
Behavioural intention (BI), 1–7	BI1 "I plan to use AI over the next 12 months"; BI2 "I will recommend these tools to colleagues"; BI3 "I will use AI more often than I do now"
Ethical concerns (EC), 1–7	EC1 "Music created with AI cannot be considered fully authored"; EC2 "Training models on works without the authors' consent is unacceptable"; EC3 "AI use in a work must be indicated"; EC4 "The spread of AI will reduce composers' incomes"; EC5 "AI music impoverishes stylistic diversity"; EC6 "AI devalues professional composition education"
Blind test, 1–7	8 excerpts of 30 s each (4 AI, 4 human) in random order; for each – origin (AI or human), originality and expressiveness

Source: questionnaire designed by the authors; expected usefulness (PE), expected effort (EE), and behavioural intention (BI) were adapted from Venkatesh et al. [21]. The 1–7 Likert response options range from "strongly disagree" to "strongly agree"; perceptual ratings range from "not at all" to "very".

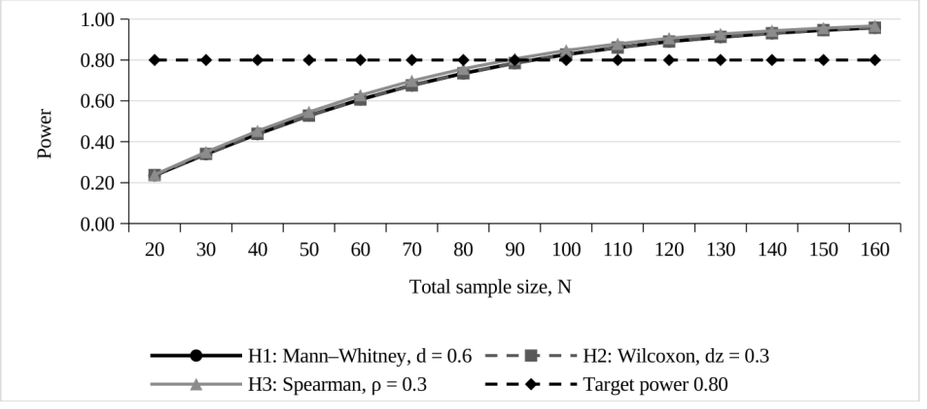


Figure 2. *Statistical Power by Total Sample Size (α = 0.05, two-sided tests)*
Source: calculated by the author (Python: statsmodels, scipy)

3.4. PLANNED HYPOTHESIS TESTS AND REPORTING

No survey or listening-test observations were available for this article. Consequently, the proposed empirical hypotheses remain untested, and no scale reliabilities, sample medians, effect sizes, p-values, or hypothesis verdicts can be reported as findings. Table 3 instead specifies the planned analyses and the results that must be disclosed after recruitment and data collection. This distinction is essential because the conceptual classification and statistical power calculations are completed elements of the present work, whereas participant-level evidence is not.

For H1, the analysis will report each group's sample size, ethical-concerns median and dispersion, the Mann–Whitney U statistic, its p-value, and an effect-size estimate. For H2, participant-level sensitivity scores d' will be reported alongside the median, the one-sample Wilcoxon statistic, and its p-value. For H3, the association between AI-use frequency and the ethical-concerns index will be evaluated with Spearman's ρ, including sample size and uncertainty where estimable. Paired originality ratings for AI-generated and human-created excerpts will be analysed separately. Reliability coefficients for the ethical-concerns, usefulness, effort, and intention scales will be reported before interpreting composite scores. Recruitment exclusions, missing observations, stimulus metadata, and the applicable ethical approval and consent process must also be documented.

Table 3. *Planned Hypothesis Tests and Required Reporting Outcomes*

Analysis	Comparison or Association	Statistical Procedure	Outputs Required After Data Collection
H1: ethical concerns	Professional versus student composers	Mann–Whitney U test	Group medians, U, p-value, effect size, and group sizes
H2: origin discrimination	Participant sensitivity d' versus zero	One-sample Wilcoxon signed-rank test	Median d', test statistic, p-value, and distribution
H3: AI use and ethical concerns	Frequency of AI use versus ethical-concerns score	Spearman rank correlation	ρ, p-value, sample size, and uncertainty
Originality comparison	Ratings of human and AI excerpts within participants	Paired Wilcoxon signed-rank test	Median paired difference, test statistic, and p-value

These analyses are prospective. No participant data or hypothesis-test results are reported in this article.

4. DISCUSSION

The proposed typology develops Gioti's idea of distributed co-creativity [10]: the assistant and co-creator levels correspond to the extension rather than the replacement of the composer. It differs from the classification by system tasks [6] in that it divides AI participation according to the distribution of decisions between the human and the system. The levels of the model correspond to the forms of automation in the typology of Celis Bueno and Salvador-Mata [23]: the assistant and co-creator correspond to augmentation and human-enhanced automation, and the autonomous generator to replacement. It is at this level that the surplus of artists and the devaluation of labour discussed by Morreale [4] arise. The narrowing of harmonic and formal variety in Suno tracks [2] gives the challenge of stylistic diversity an empirical basis.

The safeguards of the upper level draw on proposals for an AI-royalty fund [24] and collective licensing [25]; the model links them specifically to autonomous generation. For Ukraine, the model sharpens the question raised by Oprysk [5]: the sui generis right protects the generated result but does not identify the rightsholder. Such protection gives nothing to the authors on whose works the model was trained, and without labelling and remuneration for them, the asymmetry described in the review will increase. The eligibility criteria for protection that are lacking according to Shtefan [26] should be linked to documenting creative contribution at the co-creator level. For music education, the model suggests a sequence of learning: from the critical use of tools to the contractual formalisation of co-creativity.

A future test of H2 could establish whether professional composers recognise musical origins more accurately than the musically trained listeners examined by Chang and Jing [3]. The comparison must await actual listening-test observations and consideration of differences in audio stimuli. Tigre Moura and Maw [16] documented generally negative attitudes towards AI-composed music among respondents, including music professionals. Worrall and Collins [18] described the relationship between professional identity and AI tools qualitatively. H1 and H3 translate these concerns into prospective quantitative tests; no outcomes for those hypotheses are inferred here.

The model is based on a literature review and remains untested with empirical composer samples. Practice rarely lies at one level: within one work, a composer may combine a tool, an assistant and a generator, so the levels are ideal types rather than categories of works. Thirty-second excerpts cannot convey large-scale musical form, and the eventual test result will depend on the selected generator and version; the analysis by Dalmazzo et al. [2] concerns early versions of Suno. Recruitment is expected to yield a non-probability convenience sample, limiting generalisation beyond the participating composers. The adapted UTAUT2 scales and the new ethical concerns index will require testing of their factor structure.

5. CONCLUSIONS

The literature review made it possible to distinguish four levels of AI participation in compositional work depending on who holds the decisive artistic decision. As the autonomy of the system increases, the composer moves from the role of author of all decisions to the role of client, and ethical challenges shift from the individual work (invisibility of use, reproduction of the corpus style, the boundary of authorship) to the industry: consent and remuneration of training data authors, the price of creative labour and stylistic diversity. The model assigns a safeguard to each level, and these safeguards accumulate from lower to higher levels. To test the model, a questionnaire with adapted UTAUT2 scales and an ethical concerns index and a blind test of eight excerpts have been specified. With 48 planned participants per group, the reported power analysis indicates sensitivity to an effect of about 0.59 standard deviations or greater. H1–H3 remain untested pending data collection. The contribution of the work lies in linking levels of AI participation with ethical challenges and safeguards specifically for compositional practice and in a ready design for empirical testing among Ukrainian composers. The practical implications concern music-education curricula, labelling rules in competitions and commissions, agreements on creative contributions, and possible clarification of Article 33 of the Law of Ukraine "On Copyright and Related Rights". The model has not yet undergone empirical validation. Next steps include conducting the survey and listening test, checking the scales' factor structure, and repeating the test with newer generator versions. An additional requirement is to document the origin and permissions for all excerpts and to obtain appropriate ethical clearance before recruitment.

Author Contributions

Junhan Zhia: conceptualization, supervision, and original draft preparation. Iryna Antonyuk: theoretical analysis, methodology, literature organisation, and original draft preparation. Lyudmyla Posikira: literature investigation and original draft preparation. Yelizaveta Shumakova: methodology review, critical validation of the proposed design, and manuscript review and editing. Oleksandr Rudenko: research resources, visualization, and manuscript review and editing. All authors reviewed and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no competing interests.

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Data Availability

No primary research dataset accompanies the article.

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